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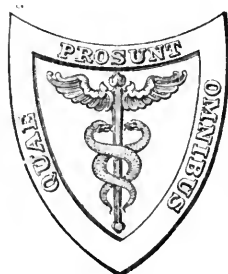
TO READERS AND CORRESPONDENTS.

ALL communications intended for insertion in the Original Department of this Journal are only received for consideration with the distinct understanding that they are sent for publication to this Journal alone, and that abstracts of them shall only appear elsewhere subsequently, and with due credit. Gentlemen favoring us with their communications are considered to be bound in honor to a strict observance of this understanding.

Contributors who wish their articles to appear in the next number are requested to forward them before the 10th of January to the Editor,

<div align="center">

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The following works have been received for review:

A Treatise on the Principles and Practice of Medicine. By AUSTIN FLINT, M.D., LL.D., late Professor of the Principles and Practice of Medicine and of Clinical Medicine in Bellevue Hospital Medical College, New York, etc. Assisted by WILLIAM H. WELCH, M.D., Professor of Pathology in Johns Hopkins University, Baltimore, and AUSTIN FLINT, M.D., LL.D., Professor of Physiology in the Bellevue Hospital Medical College, New York. Sixth edition. Philadelphia: Lea Brothers & Co., 1886.

A Manual of Obstetrics. By A. F. A. KING, A.M., M.D., Professor of Obstetrics and Diseases of Women and Children in the Medical Department of the Columbian University, Washington, D. C., and in the University of Vermont. Philadelphia: Lea Brothers & Co., 1886.

Manual of Physiology. A Text-Book for Students of Medicine. By GERALD F. YEO, M.D., F.R.C.S., Professor of Physiology in King's College, London, etc. Second American edition. Philadelphia: P. Blakiston, Son & Co., 1886.

A Text-Book of Human Physiology, including Histology and Microscopical Anatomy, with Special Reference to the Requirements of Practical Medicine. By DR. L. LANDOIS, Professor of Physiology and Director of the Physiological Institute, University of Greifswald. Second American, translated from the fifth German edition. With additions. By WILLIAM STIRLING, M.D., Sc.D., Brackenbury Professor of Physiology and Histology in Owens College and Victoria University, Manchester. Philadelphia: P. Blakiston, Son & Co., 1886.

The Curability of Insanity. A Series of Studies. By PLINY EARLE, A.M., M.D., late Superintendent of the State Lunatic Hospital at Northampton Mass. Philadelphia: J. B. Lippincott Co., 1887.

A Treatise on the Practice of Medicine, for the Use of Students and Practitioners of Medicine. By ROBERTS BARTHOLOW, M.A., M.D., LL.D., Professor of Materia Medica, General Therapeutics, and Hygiene, in the Jefferson Medical College of Philadelphia. Sixth edition. New York: D. Appleton & Co., 1886.

Paralyses, Cerebral, Bulbar, and Spinal. A Manual of Diagnosis for Students and Practitioners. By H. CHARLTON BASTIAN, M.D., F.R.S. New York: D. Appleton & Co., 1886.

Outlines of the Pathology and Treatment of Syphilis and Allied Venereal Diseases. By HERMANN VON ZEISS, M.D., late Professor at the Imperial Royal University at Vienna. Second edition, revised. By MAXIMILIAN VON ZEISSL, M.D. Authorized edition. Translated, with Notes, by H. RAPHAEL, M.D., Attending Physician for Diseases of the Genito-Urinary Organs and Syphilis, Bellevue Hospital, Out-patient Department. New York: D. Appleton & Co., 1886.

How We Treat Wounds To-day: A Treatise on the subject of Antiseptic Surgery which can be Understood by Beginners. By ROBERT T. MORRIS, M.D., late House Surgeon to Bellevue Hospital, New York. Second edition. New York and London: G. P. Putnam's Sons, 1886.

Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Vol. VII. Washington, 1886.

Handbook of Zoölogy. With Examples from Canadian Species, Recent and Fossil. By SIR J. WILLIAM DAWSON, LL.D., F.R.R.S, etc. Third edition. Montreal, 1886.

Medico-Chirurgical Transactions. Published by the Royal Medical and Chirurgical Society of London. Sixty-ninth volume. London: Longmans, Green & Co., 1886.

Transactions of the Obstetrical Society of London. Vol. XXVIII. For the Year 1886. Part III. For May, June, and July. London, 1886.

The Royal London Ophthalmic Hospital Reports. Vol. XI. Part 2. July 1886. Edited by R. MARCUS GUNN, M.A., F.R.C.S.

The Medical Profession in Ireland, and its Work.   By E. D. Mapother, M.D., Consulting Medical Officer of Health for Dublin.   Dublin, 1886.

Three Lectures Delivered at the Hospital for Sick Children.   By Robert G. Lee, M.D., F.R.C.P. Lectures I., II.   On the Transmission of Syphilis ; with Cases arranged to Illustrate the Relations between the various Symptoms of Hereditary Syphilis in Children, and the Parental History.   Lecture III.   On the Earliest Record of Whooping-Cough.   London, 1886.

Du Délire Chez les Dégénérés.   Observations Prises a L'Asile Sainte-Anne 1885–1886 (service de M. Magnan).   Par le Dr. M. Legrain, Ancien interne des asiles d'aliénés de la Seine.   Ancien externe des hôpitaux.   Paris : A. Delahaye et E. Lecrosnier, 1886.

Du Traitement des Phenomenes Douloureaux de l'Ataxie Locomotrice Progressive par Pulverisations d'Ether et de Chlorure de Methyle.   Par A. G. Raison.   Paris, 1886.

Handbuch der Physiologischen Optik.   Von H. von Helmholtz.   Zweite umgearbeitete Auflage. Dritte Lieferung.   1886.

Die künstliche Beschrankung des Kinderzahl als sittliche Pflicht.   Von Hans Ferdy.   Zweite Auflage.   Berlin, 1886.

Die Mittel zur Verhütung der Conception, nebst einem Versuche zur kritischen Entscheidung eines streitigen Punktes der Conceptionstheorie.   Von Hans Ferdy.   Berlin, 1886.

Zur medicinischen Statistik.   Von J. Apella.   Berlin, 1886.

Die Brasdor'sche Operation bei Aneurysmen des Arcus Aorta und der Anonyma.   Von Dr. Jul. Rosenstirn.

Medical Education and Medical Colleges in the United States and Canada, 1765–1886.   Illinois State Board of Health.   Springfield, Ill.

The Action of Microörganisms upon Surgical Wounds, with Demonstrations.   By Frederic S. Dennis, M.D., Professor of the Principles and Practice of Surgery, Bellevue Hospital Medical College, New York City.

Cases in Orthopædic Surgery.   By Ap-Morgan Vance, M.D.   Louisville, Ky., 1886.

Temperature of the Body in Health and Disease.   By H. Hathaway. M.D.   Toledo.

A Case of Pregnancy Complicated with Uterine Fibroids and Measles.   By D. W. Cathell, M.D., Baltimore, M.D.

Meconeuropathia.   By C. W. Hughes, M.D.   St. Louis, Mo., 1886.

The Curette as a Diagnostic and Therapeutic Agent in Gynecology and Obstetrics.   By B. Bernard Brown, M.D., Professor of Diseases of Women in the Woman's Medical College of Baltimore.   Baltimore, Md., 1886.

Fibro- or Spindle-celled Sarcomatous Tumors, with the Report of a Case, and Presentation of the Specimen.   By B. A. Watson, A.M., M.D., Surgeon to Charity, St. Francis, and Christ Hospitals, Jersey City, N. J.   Chicago, 1886.

The Surgery of the Pancreas, as Based upon Experiments and Clinical Researches.   By N. Senn, M.D., of Milwaukee, Wis., Attending Surgeon to Milwaukee Hospital.   Philadelphia, 1886.

Method in Medical Study.   By Charles H. Mays, M.D., Instructor in Ophthalmology, New York Polyclinic.   1886.

The Exploration, Excavation, and Illumination of the Interior of Bones in any Part of the Body. By Milton Josiah Roberts, M.D., Professor of Orthopædic Surgery and Mechanical Therapeutics in the New York Post-Graduate Medical School and Hospital.

The Human Color-Sense Considered as the Organic Response to Natural Stimuli.   By L. Webster Fox, M.D., und George M Gould, A. B.

Puerperal Eclampsia.   By George W. Miltenberger, M.D., Professor of Obstetrics, University of Maryland.   1886.

Hypertrophic Nasal Catarrh.   By A. B. Thrasher, M.D., Physician to Medical Dispensary, Medical College of Ohio.

A Case of Convergent Squint, Associated with Myopia of High Grade.   Tenotomy of both Recti Interni Muscles.   Restoration of Binocular Vision, The Divided Muscles still Retaining a Preponderance of Power.   By Samuel Theobald, M.D , Surgeon to the Baltimore Eye, Ear, and Throat Charity Hospital.

Malarial Hæmoglobinuria.   By H. McHatton, Macon, Ga.

Report on Classification of Mental Diseases as a Basis of International Statistics of the Insane, made to the Belgian Society of Mental Medicine.   By Clark Bell, Esq., International Delegate for North America.

Two Rare Cases of Abdominal Injury.   By S. C. Stucky, M.D., Lexington, Ky.

The Sanitary Condition of Harrisburg, Pa.   By Hugh Hamilton, M.Sc., M.D., Harrisburg, 1886.

A System of Case Records.   Arranged by Reynold W. Wilcox, M.A , M.D., Instructor in Clinical Medicine in the New York Post-Graduate Medical School.

Sydenham and Hahneman.   By F. B. Stephenson, M.D., U. S. Navy.

Is Electrolysis a Failure in the Treatment of Urethral Strictures?   By Robert Newman, M.D.   New York, 1886.

Observations on the Administration of Chloroform. By T. J. SULLIVAN, M.D., Ann Arbor.

A Case of Atresia of the Vagina and Division of the Urethra and Base of the Bladder. By T. J. SULLIVAN, M.D., Ann Arbor.

The Prevention of Insanity. By GUSTAVUS ELIOT, A.M., M.D., New Haven. Hartford, 1886.

The Relation of Hospitals to Medical Education. By CHARLES FRANCIS WITHINGTON, M.D. Boston, 1886.

The Non-Identity of Croupous Tonsillitis with Diphtheria. By L. EMMETT HOLT, M.D., Instructor in the New York Polyclinic.

Massage in Nervous Diseases. By GEORGE W. JACOBY, M.D., Physician to the Class of Nervous Diseases of the German Dispensary of the City of New York.

The Immediate Restoration of Parts to the Normal Positions after Tenotomy. By REGINALD H. SAYRE, M.D., Attending Orthopedic Surgeon to the Out-Door Department of Bellevue Hospital, New York. New York, 1886.

Some Recent Experiences in Clinical Surgery. Illustrated by Notes of Cases, Pathological Specimens, and Patients. By DONALD MACLEAN, M.D.

Amputation at the Hip-Joint for Morbus Coxæ ; with a Case and a Specimen. By DONALD MACLEAN, M.D., of Detroit, Mich.

Operations on the Drum-Head for Impaired Hearing. With Fourteen Cases. By SETH S. BISHOP, M.D., of Chicago, Attending Surgeon to the Illinois Eye and Ear Infirmary. Chicago, 1886.

On Toxic Urine in Relation to Certain Surgical Operations on the Urinary Organs. By REGINALD HARRISON, F.R.C.S. , Surgeon to the Liverpool Royal Infirmary.

Board of Health. Report on the Biloxi Fever. Miss., 1886.

Report on Rhinology. The Treatment of Nasal and Pharyngo-Nasal Catarrh. By J. ADDISON STUCKY, M.D., Lexington, Ky.

Venous Blood Tumors of the Cranium in Communication with the Intracranial Venous Circulation, especially the Sinuses of the Dura Mater. By WM. M. MASTIN, M.D., of Mobile. Chicago, 1886.

The Collocation of a Suture and Fissure in the Human Fœtus. By BURT G. WILDER, M.D., of Ithaca, New York, 1886.

Human Cerebral Fissures, their Relations and Names, and the Methods of Studying Them. By BURT G. WILDER, M.D., of Ithaca, New York. 1886.

A Case of Pregnancy complicated with Uterine Fibroids and Measles. By D. W. CATHELL, M.D., of Baltimore. 1886.

Address in State Medicine. By JOHN H. RAUCH, M.D., of Illinois, Chairman of the Section of State Medicine, Chicago, 1886.

In Memoriam : Austin Flint, M.D., LL.D., James Marion Sims, M.D., LL.D. By WESLEY M. CARPENTER, M.D.

Report on Surgery. By G. L. SIMMONS, M.D. Sacramento, 1886.

Galvanocautery in Diseases of the Prostate, Bladder, and Urethra. By ROBERT NEWMAN, M.D., of New York. Chicago, 1886.

On the Employment of Thallin in Febrile Affections. By J. P. CROZER GRIFFITH, M.D., Assistant to the Professor of Clinical Medicine in the University of Pennsylvania.

Surgical Notes from the Case Book of a General Practitioner. By WILLIAM C. WILE, M.D., of Newton, Conn.

Method of Managing Typhoid Fever. By F. PEYRE PORCHER, M.D., Professor in Medical College of the State of South Carolina, Charleston.

Surgical Lesions of the Brain and its Envelopes. By NICHOLAS SENN, M.D., of Milwaukee.

Elephantiasis Arabum of the Labia Majora. A Case of Successful Operation by Excision. By HENRY J. RAYMOND, A.M., M.D , Assistant Surgeon U. S. Army.

Electrolysis in Gynecology. With a Report of Three Cases of Fibroid Tumor Successfully Treated by the Method. By FRANKLIN H. MARTIN, M.D., of Chicago. Also Supplementary Papers citing Two Cases of Fibroid Tumor Treated by Electrolysis. By J. F. FREEMAN, M.D., of Brooklyn, N. Y.

Principles of Hygiene for the School and the Home, together with so much of Anatomy and Physiology as is necessary to the Correct Teaching of the Subject. By EZRA M. HUNT, A.M., M.D., Sc.D., Secretary of the State Board of Health of New Jersey. New York and Chicago : Ivison, Blakeman, Taylor & Co., 1886.

Transactions of the Texas State Medical Association, April, 1886. Austin, 1886.

Transactions of the American Surgical Association. Vol. IV. Edited by J. EWING MEARS, M.D., Recorder for the Association. Philadelphia, 1886.

Proceedings of the Academy of Natural Sciences of Philadelphia. Part II. April–September, 1886. Philadelphia, 1886.

Transactions of the New Hampshire Medical Society at the Ninety-sixth Session, held at Concord, June, 1886. Manchester, N. H., 1886.

Transactions of the Medical and Chirurgical Faculty of Maryland. Baltimore, 1886.

Transactions of the Medical Association of Missouri. St. Louis, 1886.

Transactions of the Mississippi State Medical Association. Jackson, 1886.

Transactions of the Medical Association of the State of Alabama. The State Board of Health. Session of 1886, Anniston, April 13–16, 1886. Montgomery, Alabama, 1886.

Report of the Board of Health of the State of Rhode Island for 1885; and including the Report upon Births, Marriages, and Deaths, in 1884. Providence, 1886

Report of the State Board of Health and Vital Statistics of the Commonwealth of Pennsylvania. Harrisburg, 1886.

Report of the State Board of Health of Illinois. With an Appendix. Springfield, Ill., 1886.

Report of the State Board of Health of the State of Michigan for 1885. Lansing, 1886.

Report of the State Board of Health of California for 1886. Sacramento, 1886.

Proceedings and Addresses at the Sanitary Convention held at Kalamazoo, Mich., June 1 and 2, 1886, under the direction of a Committee of the State Board of Health. Lansing, 1886.

Annual Report of the Commissioners of Pensions to the Secretary of the Interior for the year ended June 30, 1886 Washington, 1886.

Annual Report of the Alumni Association, with the Exercises of the 65th Commencement of the Philadelphia College of Pharmacy, for the year 1885–1886.

Thirteenth Annual Report of the Maternity Hospital. Philadelphia, Pa., 1886.

The following Journals have been received in exchange :

Albany Medical Annals.
Alienist and Neurologist.
American Chemical Journal.
American Druggist.
American Journal of Insanity.
American Journal of Obstetrics.
American Journal of Pharmacy.
American Journal of Science.
American Lancet.
American Medical Digest.
American Practitioner.
Annals of Surgery.
Archives of Ophthalmology.
Archives of Otology.
Archives of Pediatrics.
Atlanta Medical and Surgical Journal.
Boston Medical and Surgical Journal.
Buffalo Medical and Surgical Journal.
Chicago Medical Journal and Examiner.
Cincinnati Lancet and Clinic.
Cincinnati Medical News.
Cleveland Medical Gazette.
College and Clinical Record.
Columbus Medical Journal.
Daniels' Medical Journal.
Dental Cosmos.
Denver Medical Times.
Druggist's Circular.
Florida Medical and Surgical Journal.
Fort Wayne Journal of Medical Science.
Gaillard's Medical Journal.
Independent Practitioner.
Iowa State Medical Reporter.
Journal of the American Medical Association.
Journal of the Franklin Institute.
Journal of Nervous and Mental Diseases.
Kansas City Medical Record.
Kansas City Medical Index.
Louisville Medical News.
Maryland Medical Journal.
Medical Age.

Medical Analectic.
Medical Herald.
Medical News.
Medical Press of Western New York.
Medical and Surgical Reporter.
Medical Record.
Mississippi Valley Medical Monthly.
Nashville Journal of Medicine and Surgery.
New England Medical Monthly.
New Orleans Medical and Surgical Journal.
New York Medical Journal.
New Yorker Medizinische Presse.
North Carolina Medical Journal.
Northwestern Lancet.
Obstetric Gazette.
Pacific Medical and Surgical Journal.
Peoria Medical Monthly.
Philadelphia Medical Times.
Physician and Surgeon.
Polyclinic.
Popular Science Monthly.
Quarterly Compendium of Medical Science.
Quarterly Journal of Inebriety.
Rocky Mountain Medical Times.
Sanitarian.
Sanitary Engineer.
Sanitary News.
Southern California Practitioner.
Southern Medical Record.
Southern Practitioner.
St. Louis Courier of Medicine.
St. Louis Medical and Surgical Journal.
Texas Courier of Medicine.
Therapeutic Gazette.
Virginia Medical Monthly.
Weekly Medical Review.
Western Medical Reporter.
Canada Lancet.
Canada Medical Record.
Canada Medical and Surgical Journal.
Canadian Practitioner.

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Professor of Anatomy at University College, London.

PHYSIOLOGY.

Under the charge of GERALD F. YEO, M.D.,
Professor of Physiology at King's College, London.

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

Under the charge of ROBERTS BARTHOLOW, M.D., LL.D.,

Professor of Materia Medica, General Therapeutics, and Hygiene in Jefferson Medical College, Philadelphia.

MEDICINE.

Under the charge of WILLIAM OSLER, M.D., F.R.C.P. LOND.,

Professor of Clinical Medicine in the University of Pennsylvania.

ASSISTED BY

J. P. CROZER GRIFFITH, M.D.,

Assistant to the Professor of Clinical Medicine in the University of Pennsylvania.

WALTER MENDELSON, M.D.,

Instructor in the Laboratory of the College of Physicians and Surgeons, New York.

SURGERY.

(IN EUROPE.)

Under the charge of FREDERICK TREVES, F.R.C.S.,
Surgeon to, and Lecturer on Anatomy at, the London Hospital.

(IN AMERICA.)

Under the charge of R. J. HALL, M.D.,
Attending Surgeon to St. Luke's Hospital, Assistant Surgeon to Roosevelt Hospital, New York.

OPHTHALMOLOGY.

Under the charge of L. WEBSTER FOX, M.D.,

Ophthalmic Surgeon to the Germantown Hospital, Clinical Chief, Ophthalmological Department Jefferson Medical College Hospital.

OTOLOGY.

Under the charge of CHARLES H. BURNETT, M.D.,

Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine, etc.

DERMATOLOGY.

Under the charge of LOUIS A. DUHRING, M.D.,

Professor of Dermatology in the University of Pennsylvania,

AND

HENRY W. STELWAGON, M.D.,

Physician to the Philadelphia Dispensary for Skin Diseases.

MIDWIFERY AND GYNECOLOGY.

Under the charge of D. BERRY HART, M.D., F.R.C.P.E.,

Lecturer on Midwifery and Diseases of Women, Surgeon's Hall, Edinburgh, etc.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

Under the charge of MATTHEW HAY, M.D.,

Professor of Medical Jurisprudence, University of Aberdeen.

PUBLIC HEALTH.

Under the charge of SHIRLEY F. MURPHY, M.R.C.S.

Lecturer on Hygiene and Public Health, St. Mary's Hospital, London.

RUBELLA (RÖTHELN).[1]

By I. E. Atkinson, M.D.,
PROFESSOR OF MATERIA MEDICA AND THERAPEUTICS, ETC., IN THE UNIVERSITY OF MARYLAND ;
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ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

WHILE the broad lines separating measles and scarlatina are universally recognized, there has been anything but harmony among writers concerning certain anomalous forms of eruptive fever prevailing from time to time which present mingled characters of the two affections, or which appear to present the features of an independent affection. Ever since the middle of the last century, they have attracted much attention, and while, for the most part, they have been considered as aberrant forms of measles or scarlatina, there can be noticed a constantly recurring disposition to gather together, under a special designation, certain cases prevailing sporadically or epidemically, which seemed to offer peculiarities distinguishing them from these two diseases. According to Emminghaus, de Bergen (de roseolis), in 1752, was in favor of separating rötheln from scarlatina and measles.[2] Selle, in 1780, declared rötheln to be an independent affection. The question was discussed by various writers, among whom were Zeigler (1788), Thompson (Edinburgh, 1800), Fleisch (1804), Strohmyer, and others. They all, however, described dangerous affections which seem to have been abnormal forms of scarla-

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[1] Read at the tenth annual meeting of the American Dermatological Association, August 26, 1886.

[2] I am indebted to the articles of Emminghaus (Jahrb. f. Kinderheilk., 1870–71, N. F 4, S 47, and Gerhardt's Handbuch f. Kinderkr., 1877, B. 2, S. 336), and of Klaatsch (Zeitsch. f. klin. Med., 1885 10, 1), for most of my historical references.

tina, but which differed widely in their symptomatology.   In Hufeland and Henle's *Journal* (1812) Heim wrote concerning "the difference between scarlatina, rötheln, and measles."   Willan, in his account of *rubeola sine catarrho*, observed that it did not protect from measles. Bateman made it a variety of this disorder, but Maton, in 1815, recognized its independent nature (Squire).   In 1818, however, Henle pronounced rötheln a variety of scarlatina.

A number of writers now successively described epidemics of benign macular eruptions, neither measles nor scarlatina, which did not afford protection from these diseases, attacking all alike, but which nearly always appeared when measles or scarlet fever prevailed, or had preceded or followed by short intervals, in localities proximate to where these exanthems were to be found.   In 1822, Schönlein, for example, noted that in the "Rheinprovinz" measles was rife, beyond the Elbe, scarlet fever, and between these two districts, rötheln.   G. v. d. Busche described an epidemic (1841) beginning with measles, at the height of which rötheln appeared, and when this reached its acme scarlatina became active.   Gertsema, in Groningen, in 1821, and again in 1834, had seen similar epidemics; likewise Wagner and Paasch (1854).   Schönlein had tried to harmonize the discordant opinions by regarding rötheln as a disease in which the relations between the skin and mucous membrane were such that when scarlatinal symptoms developed upon the skin the mucous membrane showed those of measles, and *vice versâ*.

Gradually, all affections having a red macular eruption and not recognizable as measles or scarlatina, came to be described as rötheln, and great confusion resulted.   Some writers, even, were induced to fall back upon the old teaching of the identity of measles and scarlatina. The identity of rötheln seemed quite disproved, especially when Hebra entirely discredited its specific existence, and Wunderlich spoke of rötheln as a synonym for measles.   Gelmo,[1] having observed anomalous epidemics in Vienna in 1848, 1851, and 1857, of which the features were most perplexing, concluded that, although eruptive forms, characteristic neither of measles nor of scarlatina, develop during the transitions of epidemics of measles and scarlatina, epidemics of one or the other of these affections grew out of them always; that isolated cases, anomalies of scarlatina or measles, could not justify the establishment of a separate species; and that, finally, no grounds existed for considering rötheln a distinct disease.   Kostlein,[2] as late as 1865, held rötheln to be a variety of measles.

Balfour,[3] however, in 1857, regarded rötheln as a special disease, and in 1864 Grove[4] and Thierfelder[5] wrote of it.   Veale[6] in 1866,

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[1] Jahrb. f. Kinderheilk., Wien, 1858, Bd. 1, 152.   [2] Wiener med. Presse, 1868, 13
[3] Edinb. Med. Journ., 1857, p. 718.   [4] Lancet, 1864, 566 *et seq.*
[5] Greifswald Medicinische Beiträge, 1864, Bd. ii.   [6] Edinb. Med. Journ., Nov. 1866.

Schwarz[1] in 1868, Oesterreich[2] in the same year, Mettenheimer,[3] Steiner,[4] and especially Thomas[5] in 1869, and Emminghaus[6] in 1870, rapidly followed in a series of able articles that forthwith rescued rötheln from the oblivion in which previous writers had threatened to overwhelm it. In 1870 Murchison[7] contributed an article upon this subject, since which time many British physicians have devoted attention to it. Among them may be noted Fox,[8] Liveing,[9] Cheadle,[10] Squire,[11] and Tonge-Smith.[12] In France, until recently, rötheln attracted little attention. Bourneville and Bricon,[13] it is true, claim that it had long been recognized. Trousseau[14] regarded it as a distinct affection. It has also been considered by Trastour, Longuet, Lubanski,[15] and others. In America, though it is said to have been described by Homans, Sr., in 1845, and by Cotting in 1853 and 1871,[16] it is to the pen of J. Lewis Smith[17] that we owe the first systematic notice of the disease.

A large number of communications have lately appeared in the journals, adding materially to the sum of our knowledge of the disease. The excellent article by Hardaway in Pepper's *System of Medicine* is especially to be commended. Edwards's valuable paper in the AMERICAN JOURNAL OF THE MEDICAL SCIENCES[18] gives an extensive bibliography of American writers upon rötheln. Important contributions have also been made by Duhring, Park, Hatfield, Harrison, and others.

Thus the "rötheln question" has only within twenty years assumed a phase that gives hope of its satisfactory solution. The recent stimulus given it, however, threatens again to relegate it to the domain of medical conundrums; for, while earlier writers were disposed to deny that rötheln was anything but aberrant measles or scarlatina, the recent tendency is to assign to it all anomalous cases and epidemics that resemble but do not correspond with these affections. Doubtless many of these are aberrant forms, or, possibly, combinations of measles and scarlatina. The study of rötheln is thus rapidly becoming obscured by fantastic and motley embellishments, and there is reason to fear that the resulting confusion will reawaken the early scepticism concerning it.

DEFINITION.—Rötheln (synonyms: German measles; rubeola; rubeola notha; rubeolo sine catarrho; roseola epidemica, etc.) is a specific, exanthematic, contagious disorder, characterized by a period of incubation lasting usually from two to three weeks; a prodromal period varying

[1] Wiener med. Presse, 1868, 13.
[2] Inaug. Dissert , Leipzig, 1868.
[3] Journ. f. Kinderkr., 1869, 53.
[4] Archiv f. Dermatol. u. Syph., 1869, 237.
[5] Jahrb. f. Kinderh., 5 Jahrg.
[6] Ibid., 1870–71, N. F. 4, p. 47.
[7] Lancet, 1870, 595.
[8] Med. Times, London, 1870, 360.
[9] Lancet, 1874, 360.
[10] Trans. Internat. M. Cong., Lond., 1881, iv.
[11] Ibid.
[12] Lncet, 1883, 994.
[13] Le Prog. Méd., xii. 578.
[14] Clinical Lectures.
[15] Union Médicale, 1884, No. 7 *et seq.*
[16] Boston Med. and Surg. Journ., 1873; and Trans. Internat. M. Cong., London, 1881.
[17] Archives of Dermatology, vol. i.
[18] October, 1884.

from a scarcely appreciable interval to one day, less commonly two, and very rarely several days; and an eruptive period in which there is an exanthem closely resembling that of measles. A period of desquamation is in most cases wanting, and when present is but feebly developed. During the attack, and frequently preceding the eruption, there occurs almost constantly an enlargement of the cervical, submaxillary, auricular, suboccipital, and sometimes of other glands, which is often painful, but never suppurative. Catarrhal symptoms are absent or but slightly marked. A faucial hyperæmia is almost constant, but is rarely accompanied by pain. Throughout the attack fever is absent in about half of the cases, and when present rarely endures to the end of the second day or exceeds 39° C. (102.2° F.). The attack seldom lasts longer than three or four days, and the patient rarely keeps to his bed. The affection may prevail sporadically or epidemically, and is contagious, though to a less degree than measles. One attack usually confers immunity from subsequent ones, but does not protect from measles or scarlatina, nor do these exanthems confer immunity from rötheln. Children are usually affected, though adults have no special insusceptibility.

ETIOLOGY—CONTAGION.—Rötheln never occurs spontaneously, but is not violently contagious—far less so than measles. Steiner,[1] whose conceptions of its characteristics are especially definite, denies that it is at all contagious. V. Nymann[2] asserts that its contagiousness is almost *nil*. Klaatsch[3] considers it not very active. Only one-half in a school of sixty scholars were attacked (Veale). Park[4] noted that only two-thirds of those exposed to it were attacked.

Tonge-Smith[5] regards rötheln as having a not very intense contagiousness, lasting not longer than a week. Thierfelder thought it most contagious during convalescence, and Squire considers it contagious even before the rash and for two or three weeks afterward. While nearly all writers admit its contagiousness, it must be admitted that as yet we know little about the period when the contagion is most active.

AGE AND SEX.—Rötheln attacks the sexes indifferently. Of 331 cases gathered from various sources, 151 were males and 180 females. The difference here is probably accidental. Infants are not often attacked, though Sholl[6] reports a case of an infant a few days old, and Roth one of six months. Steiner saw it in a child of eight months. Lewis Smith also had infants among his patients. Seventy-two per cent. of all his cases were between the ages of two and ten years. Tonge-Smith's cases included, in a total of 145, 132 more than fifteen years old. Most observers report adult cases; Seitz[7] has recorded it in a woman seventy-

[1] Archiv f. Dermatol. u. Syph., 1869, 237.
[2] Oesterreich, Jahrb. f. Pædiat., N. F. iv. Bd. 2, 123.
[3] Zeitschr. f. klin. Med., 1885, 10, 1.
[4] Chicago Med. Journ. and Exam., 1881, xlii. 130.   [5] Lancet, 1883, 994.
[6] Transact. Med. Soc. Alabama, 1881.   [7] Ziemssen's Cyclop.

three years old. These variations show that the time at which rötheln is most apt to occur is not a question of years, but of exposure and protection. Most reports come from asylums and children's hospitals, where but few adults are exposed. Adults unprotected by attacks of rötheln during childhood probably enjoy no immunity. Kassowitz,[1] however, noted but five adults among his sixty-four cases in private practice.

RELATION TO OTHER ERUPTIVE FEVERS.—It has been urged against the specific identity of rötheln that it tends to prevail with or immediately before or after epidemics of scarlatina or measles. This tendency was especially noted by earlier writers, whose descriptions suggest that they had reference to anomalous forms of measles or scarlatina, quite as often as to rötheln. The same tendency, however, has been observed by those who entertain definite views of the nature of rötheln; but as rötheln is observed quite independently of prevailing epidemics of either of these diseases, it seems probable that these are coincidences without significance, and have an analogue in similar coincident prevalence of other eruptive fevers. It is a point of the greatest importance, however, that, although rötheln often closely corresponds in point of time with measles or scarlatina, the diseases are not mutually protective. Those who have had the latter affections are as susceptible of rötheln as those who have not, and an attack of the last named disorder in no wise lessens the liability to either of the former. This is universally admitted. Of Steiner's 21 cases, 6 had had scarlet fever and measles, and 7 had had measles alone; of Thomas's 23 cases, 12 had had measles, and 3 scarlatina; of 48 cases recorded by Lewis Smith, 19 had had measles, and 1 contracted measles one month subsequently. Dukes[2] noted 63 cases in 1877, of which 39 had had measles, and 25 cases in 1878, of whom 22 had had measles. Of 19 cases under the observation of Roth,[3] 7 had had measles within seven or eight weeks; and Rott[4] reported 17 cases, of which 16 had already had measles. Of Veale's 30 cases, 13 had had measles. Shuttleworth[5] noted that of his 31 cases, 11 had already had measles, and 7 measles and scarlatina. Subsequently 2 of these patients had measles, 5 measles and scarlatina, and 2 scarlatina only. Most of Parks's 100 cases had had measles during the previous winter or spring. There is thus abundant evidence that no immunity is afforded by an attack of rötheln against measles and scarlatina, and *vice versâ*. Indeed, the second malady sometimes follows closely upon the heels of the first.

INCUBATION.—This is longer than is usual with the exanthemata, though wide variations are observed. Robinson[6] determined in his cases

[1] Trans. Internat. Med. Cong , London, 1881, iv p. 10.
[2] Lancet, 1881, 745.   [3] Deutsch. Archiv f. klin. Med., 14, 539.
[4] Aertzl. Intelligenz-Blatt, 1879, x. p. 101.
[5] Transact. Internat. Med. Cong., London, 1881, iv.   [6] Medical Times and Gazette, 1880.

a period of 6 to 7 days.   Bristowe[1] considers incubation to last 1 week;
Edwards[2] about 10 days (shortest incubation 6 days, the longest 21
days); Lewis Smith, from 7 to 21 days; Squire, from 14 days to 3 weeks;
Tonge-Smith in 10 cases noted an incubation of 14 days; Dukes, in
36 cases, from 12 to 22 days.   Roth estimates it at 18 to 19 days.
Klaatsch[3] has noted a period of 14 days often, also of 17 to 22 days, and
sometimes more than 4 weeks.   Thomas[4] places it from 2½ to 3 weeks,
probably never longer, never less.   Emminghaus[5] definitely determined
the incubation in most of his cases to be 18 days; in some 14 days, in
others as much as 20 days.   Veale's cases had an incubation of 12 days.
In a series of 30 cases, Balfour noted 14 days as the incubative period;
Duckworth[6] placed it at 16 days; Jacobi,[7] at 14 to 21 days.   A com-
parison of these figures shows the incubative period of rötheln more often
to exceed than to fall short of 14 days.   Some writers place it, definitely,
at 18 to 21 days, but general experience appears not to justify such rigid
limits.   For the present, therefore, we place the incubative period of
rötheln at from 14 to 21 days, sometimes less, rarely more.

PERIOD OF INVASION.   PRODROMAL STAGE.—In many cases, no ap-
preciable prodromal stage is present, the eruption giving the first intima-
tion of disorder.   As this is usually observed in the morning, just after
the night's rest, it is probable that brief prodromes may have occurred
during sleep.   Occasionally, prodromes may really be absent, but in the
great majority of cases symptoms of slight intensity may be observed
from a half to one day before the eruption appears; rarely prodromata
last for several days.   Steiner has asserted that there is no prodromal
stage.   Klaatsch and v. Nymann state that the eruption usually appears
without prodromes; the latter rarely observed an initial chill 1 or 2
days before the eruption.   Thomas asserted that this stage lasts from
two hours to a half day at most.   Rott observed a prodromal stage of
from a half to 1 day; Roth, of from a half to 3 days.   Veale's cases
showed the eruption on the first day.   While Emminghaus often observed
no prodromes, he, with Mettenheimer and Thierfelder usually noted them
from 1 to 3 days preceding the eruption.   Lewis Smith observed them
some hours, or a day or even longer; Parks saw no definite premonitory
symptoms.   Squire saw the eruption on the first day.   In Edwards's
cases, the average was 3 days; in Hemming's, from a few hours to 3, 4,
even 5 days; in Cheadle's, from 2 to 3 days.

These observations show that rötheln is either without a prodromal
stage or has one not exceeding 24 hours in most cases.   This character-
istic at once stamps the disease with a specific feature.   The premonitory

[1] Practice of Medicine.   [2] Zeitschr. f. klin Med., 1885, 10, 1.
[3] Loc cit.   [4] Jahrb. f. Kinderheilk., 5 Jahrg, 4 H.
[5] Gerhardt's Handbuch f Kinderkr, B. 2.   [6] Lancet, 1880.
[7] Transactions American Medical Association, 1881.

symptoms are usually limited to slight malaise, with headache, joint pains, giddiness, faintness, anorexia, and rarely nausea and vomiting; very exceptionally convulsions are noted (Smith, Lindwurm, Edwards). Shivering and an initial chill[1] may begin the attack. Smarting of the eyes and slight photophobia may occur, but beyond conjunctival injection, catarrhal symptoms are generally absent; sneezing, snuffling, cough, and hoarseness, and even croupy attacks (Balfour) may develop. The tongue is slightly coated with a dull, whitish fur. Often at this stage mild pharyngeal distress is experienced and the fauces show a diffused or a maculated hyperæmia.

A common symptom of this stage is the adenopathy characteristic of the stage of eruption, involving the occipital, posterior, and anterior auricular, submaxillary, cervical, and often other glands. These become enlarged to the size of coffee-grains or larger, are tender, and may occasion swelling and stiffness of the neck. This may be the most striking symptom of this stage and may attract attention several days before the eruption appears. It is, however, not constant. In many cases fever is absent. Very often it is present to a slight extent and may subside before the beginning of the eruption (Emminghaus). In 20.1 per cent. of v. Nymann's cases it lasted only 24 hours, but was absent altogether throughout the attack in 48.73 per cent. All of Emminghaus's cases began with fever, rarely exceeding 38.5° C. (101.3° F.), and rarely reaching this point. When prodromes were prolonged into the second day, this writer noted a morning remission passing into an exacerbation as the eruption appeared. Edwards observed epistaxis among the prodromes, three times. This author thought that the prodromal symptoms increased in severity until the eruption appeared; but it is to be noted that the intensity of these symptoms bears no fixed relation to the severity of the subsequent course of the disease. Characteristic of rötheln, however, is the short duration or entire absence of febrile symptoms previous to the appearance of the eruption.[2]

STAGE OF ERUPTION.—Very often the patient is unconscious of his attack until accident reveals the eruption. In the great majority of cases upon awakening in the morning he feels unwell, and discovers the eruption upon examining his body at once, or after a brief prodromal period. It usually appears first upon the forehead and temples, rapidly extending over the face and neck, in a few hours spreads to the trunk, and thence to the upper and lower limbs. It becomes visible as pale pinkish-red macules of minute size. A faintly reddened condition of the parts first invaded may precede the exanthem. Emminghaus noted a ring of efflorescence around the neck sending prolongations between the scapulæ and over the breast between the nipples. Exceptionally the eruption

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[1] Initial chill was observed in 15.46 per cent. of v Nymann's cases.

[2] Duckworth, Lancet, 1874, 1, p. 360.

may bloom out at once over the whole surface, but almost always it attains its maximum upon different parts unequally and in the order of evolution. Upon the trunk and extremities the lesions may be at their height, while upon the head and neck they may have almost disappeared, or the reverse may occur when, as rarely happens,[1] the latter parts are last invaded. It is so fugaceous, that by this maximum intensity in different parts it affords a striking contrast with what occurs in measles usually. This evanescence has probably served to foster Heim's erroneous theory of " a local rötheln."

The eruption of rötheln is by no means uniform, and a recognition of this fact is essential to a correct appreciation of the affection. Various eruptive types have been described, for convenience, but almost invariably a more or less irregular development is observed. It is in the mildest and afebrile cases that the eruption becomes most characteristic. It then acquires a punctate appearance and a pale rose color. At first the spots do not contrast markedly with the unaffected portions of the skin, but soon they acquire a brighter color and more definiteness. They have a rounded appearance, and are not grouped into crescentic shapes, as in measles. They vary from pin-head to hemp-seed size and larger, and have been compared by Paterson, of Leith, and Heim to the effect obtained by touching white blotting-paper with a pen charged with red ink. Their color, however, is not so brilliant and their outline by no means so regularly circular as the comparison would indicate.

In mild cases they may remain isolated almost throughout. Here and there they become confluent, and in more pronounced cases confluence is frequently observed. There is always some, and sometimes marked elevation of the lesions, but the papules remain soft. By a strong and oblique light the irregular elevations may be plainly seen. The lesions are sometimes larger. They are then apt to lose the circular outline, and may be twice the size of the smaller lesions. Each spot is surrounded by an areola, and is more vividly colored toward the centre in consequence. The eruption is most abundant on the face, chest, nates, and often on the arms, forearms, and flexor surface of the thighs. The color is most vivid above, but is often intensified by the warmth of the clothing. The patches often increase in area and coalesce, and may then simulate the rash of scarlatina. The original lesions may be distinguished by pressing the surface firmly with the finger, when they will be seen to become less anæmic under the pressure than the surrounding parts (Heim). Large plaques of continuous eruption differ from the scarlatinal efflorescence in being paler, and in never prevailing to such a degree that the predominating maculo-papular character is not shown in parts less extensively invaded. They may often involve the flexor

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[1] Tonge-Smith.

surfaces of the forearms. Often the eruption resembles that of mild measles so much that the candid observer cannot distinguish it. However, it almost never assumes the dark raspberry coloration of this affection. Dunlap has observed petechial lesions, but these are most rare.

The eruption attains its full development in a few hours, and very often fades before the second day. As it fades, it assumes a duller pinkish-brown color, which is gradually replaced by a pale pigmentation, which may last several days. As the confluent eruption acquires this coloration, a striking appearance of marbling results by contrast with the unaffected skin, a condition noted by a number of writers. Not very uncommonly many of the maculo-papules become tipped with vesicles or vesico-pustules (Hardaway, Klaatsch, Edwards, Thomas). These are small, and acuminate and desiccate early. From the beginning to the final disappearance of the eruption the usual period is from three to four days. In v. Nymann's cases it had a duration of—

1 day	in 10 cases						=	8.40 per cent.
2 days	in 29 "	.	.	.	.	.	=	24.36 "
3 "	31 "	.	.	.	.	.	=	26.65 "
4 "	" 33 "	.	.	.	.	.	=	27.73 "
5 "	" 12 "	.	.	.	.	.	=	10.08 "
6 "	" 3 "	.	.	.	.	.	=	2.52 "
7 "	" 1 "	.	.	.	.	.	=	0.55 "

A more protracted eruptive stage has been noted (Liveing, 8–10 days; Edwards, 15 days). It is probable, however, that such cases are examples of unusually intense and persistent pigmentation following the hyperæmia. Though the eruption lasts two, three, or four days altogether, it is very transitory on the different parts, not often remaining more than twenty-four hours in any one locality; thus, it has frequently faded from the face when in full bloom upon the trunk, and before it had developed upon the extremities. It is important to remember that the cases with most marked general symptoms are not always those in which the eruption is most intense and persistent. The rash is not commonly attended by itching; a slight tingling or burning sensation is at most complained of.

While the eruption undergoes its development, other important symptoms appear. We have seen that fever may be absent throughout. Most patients, however, exhibit a slight rise of temperature. In a few, this has already fallen to normal when the eruption appears. In most the acme of fever corresponds, not to a period of free efflorescence, but is observed during the first day.[1] In Reid's observations, quoted by Smith, the temperature ranged in 17 cases from 97° F. to 99° F., and in 6 cases from 100° F. to 100¼° F., and in only 1 case reached 103¼° F.

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[1] E. Long Fox, however, declares that the highest temperature usually corresponds with the maximum eruption.

(on the second day). According to Tonge-Smith, the temperature rarely exceeds 100° F. Edwards observed a common rise of from 1° F. to 3° F.; rarely it reached 103°–104° F. Hemming rarely saw it exceed 101° F. While Roth considers absence of fever the characteristic condition, he has seen a temperature of 38.3° C. (100.9° F.). In only 2 of v. Nymann's 119 cases was 39.5° C. (103.1° F.) indicated. Only one-half of Klaatsch's cases had fever, and they only during one day (38° C., seldom 39° C. (100.4°–102.2° F.) in the axilla). All of Emminghaus's cases had fever, seldom exceeding 1.5° C. (2.7° F.) rise, and rarely attaining it. In Kassowitz's cases an elevation of 1.5°–1.8° C. (2.7°–3.2° F.) in the axilla was constantly observed. In all cases efflorescence was complete on the second or third day. Rott observed no fever except in complicated cases. On the other hand, high temperature was noted by E. Long Fox (103° F.), Robinson (103°–104° F.), Edwards, and others. It may be stated, as a rule, that the temperature in rötheln does not exceed 100° F. Slight exacerbations of fractions of a degree may be recorded as the parts are successively invaded by the eruption, but, upon the whole, rapid defervescence follows, the normal being reached, except after complications, before the completion of the eruption.

Conjunctival hyperæmia, usually developed in the prodromal stage, when such is present, persists with a sense of smarting during the attack. Lachrymation and photophobia are uncommon. Nasal, buccal, laryngeal, tracheal, and bronchial catarrh are absent, as a rule, in milder cases. At other times there is mild catarrh of these surfaces (Thomas). Lewis Smith noticed catarrh of the nasal, buccal, and faucial, but not of the laryngeal, tracheal, or bronchial mucous membrane. Park observed bronchial irritation in about ten per cent. of his cases with conjunctival suffusion, and had he not known that the same children had had measles, he would have been tempted to diagnosticate these cases as such. It may be concluded that although absence of catarrhal inflammation cannot be regarded as typical of rötheln, this complication is vastly less pronounced than with measles, and affords a striking contrast between these affections. The faucial mucous membrane, however, is almost constantly implicated in rötheln. Nearly all writers have observed this. Schwarz[1] thought he had established a diagnostic point between rötheln and measles in indicating in the latter affection upon the faucial mucous membrane, pinhead to hempseed and lentil-sized spots, discrete and reddish, but at times confluent and irregular, which are not seldom observed before the eruption. This undoubtedly holds for measles, but it is valueless for diagnosis, for the throat eruption of rötheln often exactly resembles that of measles. It is true, the usual appearance of the fauces in rötheln is of a diffuse redness, like that of

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mild pharyngeal catarrh, or of mild scarlatina. This is unaccompanied by much swelling or difficulty of deglutition; there may, indeed, be no subjective faucial symptoms. But quite as often, this eruption is like that of measles,[1] or the throat may have a streaked appearance. The redness extends to the palate, throat, tonsils, and larynx, but hardly ever exceeds simple hyperæmia. Lewis Smith, however, has seen mild diphtheritic inflammation. While the faucial efflorescence cannot be considered essentially different from that of measles, it is sufficiently marked to constitute a characteristic symptom of rötheln. Usually very transitory, it may persist after the subsidence of the eruption. It is more often diffuse than macular. Faucial redness was absent in only 11 of v. Nymann's cases. It disappears almost invariably by the fourth day of the disease.[2]

The digestive tract remains about as in the stage of prodromes. The tongue is rather coated, often showing a few red papillæ toward the tip. In severe cases it may become dry and brownish. The appetite and digestion are frequently hardly impaired. When fever is at all marked, the digestive tract may suffer in proportion to the degree of derangement incident to the febrile condition. A very remarkable adenopathy gives rötheln one of its most distinctive symptoms. This often precedes the eruption; more often it appears as this develops, and consists in a painful but never suppurative enlargement of the cervical, submaxillary, anterior and posterior auricular and occipital glands. The enlargement of these glands, with the eruption, often gives the patient a swollen, bloated appearance, and occasions troublesome "stiffness of the neck." Occasionally, the axillary, epitrochlear, inguinal, and popliteal glands are also enlarged (Tonge-Smith, Klaatsch). Trastour attributes to Bloch, of Denmark, the first description of this adenopathy. Klaatsch declares it so constant, that, in the dark, with the knowledge that an acute exanthem was present, the diagnosis of rötheln can be made from it alone. Hardaway has never found it absent. It appears to vary, however, in the constancy of its occurrence in different epidemics. Park saw it in about fifty per cent. of his cases; Kassowitz, in about thirty-three per cent.; Emminghaus noted its frequent occurrence. Thomas believes it to be frequent but by no means constant. V. Nymann, however, did not observe it in his cases. Its usual presence is almost universally admitted. It must not be forgotten, however, that similar adenopathies are sometimes seen in measles. Its extent is not at all proportionate to the character and intensity of concomitant symptoms. Not rarely it is the first and only symptom to attract the patient's attention. It may not be amiss to suggest here that some of the peculiar,

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[1] Löri, Jahrb. f. Kinderheilk., 1882–83, N. F. xix.

[2] Tonge-Smith observed secondary sore throat on the fourth or fifth day.

acute, and transitory multiple glandular enlargements about the head and neck, without eruption but with mild fever and tenderness, that sometimes prevail extensively, the etiological relations of which have eluded identification, *may* depend upon rötheln. The glands speedily lose their sensitiveness and diminish in size.

Kingsley, Harrison, Duckworth, and Edwards have reported albuminuria as occurring during the attack. The latter writer noticed it in thirty per cent. of his cases. In nine it was pronounced and accompanied by dropsy. Such observations are altogether exceptional and were probably due to local influences. Emminghaus observed slight albuminuria in one case. In two of five cases Duckworth observed transitory albuminuria. Most observers have never seen it complicate rötheln.

In many cases the eruption fades and leaves no trace. It is a peculiar feature of rötheln that, probably in the greater number of cases, desquamation fails to occur. This is not to be ascribed to any inherent property of the affection, but is due to the trivial degree of hyperæmia usually experienced. After more intense efflorescence, desquamation undoubtedly occurs, though so scantily that careful observation is often required to detect it. Steiner asserts, indeed, that there is no desquamation; Oesterreich, that it is almost absent; Squire, that there is almost none; Roth, that it is exceedingly uncommon; Robinson, that it is slight, and is imperceptible in mild cases; v. Nymann, that there is none; Emminghaus, that there is no notable desquamation, but that in most cases a slight furfuraceous scaling exists. Wagner, de Man, Balfour, Thierfelder, Mettenheimer, Lindwurm, Veale, and Arnold hold similar views. Henning noted more or less branny desquamation lasting five to twelve or fifteen days. Trastour describes it as furfuraceous, as also does Edwards. Hardaway states that a fine desquamation follows, but by no means invariably. It becomes evident that the usual absence of desquamation does not partake of the nature of a peculiar feature of the disease. When present, it is most commonly observed in depressed areas of the surface, as behind the clavicles or parts but little exposed to friction. Nearly all patients remain up and about the house during the attack and convalesce at once. The persistence of fever after the fourth day, or its recrudescence, should arouse apprehensions of complications.

COMPLICATIONS AND SEQUELÆ are not unknown. The possible occurrence of nephritic trouble has already been noticed. The most common complications are exaggerations of the catarrhal disorders, bronchitis, pneumonia, gastro-intestinal inflammation. Numerous other complications have been recorded, but may generally be considered rather as accidents than as having specific dependence upon rötheln. Klaatsch quotes Kronenberg as reporting four deaths from bronchitis, pneumonia, and cerebral congestion after rötheln. Rott observed that mumps frequently

followed the exanthem in from three to five days. Edwards observed enteritis and thrush in his cases. Slight œdema (face and legs) and even general dropsy have been known to follow. Hardaway has seen otorrhœa and ciliary blepharitis. Nasal and buccal catarrh may constitute sequelæ. Very rarely, relapses of rötheln are observed. They occur immediately or after several days, not later than a fortnight. (Emminghaus.)

PATHOLOGICAL ANATOMY.—The usually trivial character of the disease has not tended to awaken especial interest in its pathology or to afford opportunities to study its lesions. Thomas states, in a general way, that the eruption is due " to capillary hyperæmia of the papillary body and of the uppermost layers of the corium; this can give rise to slight inflammation and exudation between the uppermost stratum of the corium and the epidermis, but it only occurs exceptionally in a few cases and then only on single parts of the body, and involving only a minority of the spots." [1]   Nothing is known of the specific principle of rötheln.

PROGNOSIS.—This is almost invariably favorable: Tonge-Smith reported no deaths in 145 cases; Park, none in 100 cases. Thomas says the prognosis is " thoroughly favorable." V. Nymann, Steiner, Oesterreich, Emminghaus, Hardaway, Robinson, and, indeed, nearly all writers agree that it is the mildest of the exanthemata.

DIAGNOSIS.—The differential diagnosis of rötheln is not difficult except as regards measles. Here, however, it is most obscure, and can only be made with satisfaction after consideration of all concomitant circumstances. Speaking generally, broad rules may be established and relied upon as pretty constantly correct. When, however, the diagnosis has to be made for the individual and isolated case, it must be admitted that we have no positive and characteristic signs for rötheln; but the typical course of the affection markedly differs from that of measles, as is shown in the following table :

RÖTHELN.	MEASLES.
Contagiousness.	
Feebly contagious.	Violently contagious.
Incubative Stage.	
Usually from fourteen to twenty-one days. Often, however, less, but hardly ever less than one week. Rarely longer than twenty-one days.	Usually from nine to ten days. It may be only seven days or as much as eleven or twelve days. Very rarely less or more than these extremes.
Prodromal Stage.	
Very often none. Usually from one-half to two days. May be prolonged in rare cases to three, four, or even five days.	The eruption usually appears on the fourth day, sometimes earlier, rarely later.

[1] Ziemssen's Cyclopædia, vol. ii· p. 137.

RÖTHELN.	MEASLES.

Catarrh.

Frequently absent or limited to slight conjunctival hyperæmia. Nasal, faucial, and bronchial irritation rarely pronounced.

Almost invariably present, affecting conjunctiva and respiratory passages. May be slight, but usually much more severe in mild cases of measles than in severe cases of rötheln.

Lymphatic System.

Painful enlargement of occipital, auricular, cervical, submaxillary, and occasionally of other glands; quite constant during eruptive and frequent during prodromal stage.

Painful enlargement of these glands decidedly uncommon.

Circulatory System.

Temperature very often normal throughout. Rarely exceeds 100° F. (37.8° C.). High temperatures only exceptionally observed. Maximum fever corresponds to development of eruption during first two days and does not necessarily correspond to maximum eruption. The fever rarely endures beyond the third day.

Fever always present, often intense. Maximum fever corresponds with maximum eruption on the sixth day. Defervescence rarely complete before seventh or eighth day.

Eruption.

Appears on the first, second, or third day, rarely later. Often disappears from parts first invaded before other parts are attacked. It is pale rose-red in color, and only rarely assumes a dusky red. It is usually discrete, sometimes diffuse. In the former case the lesions are papulo-macular and generally circular, and do not tend to form crescentic groups. In the latter cases, they often coalesce by fusion of their borders and form pale red continuous surfaces. These are not, however, universal and are always associated with the discrete rose-colored spots, which are not uniform in size and not always circular, but may be angular and measles-like. The eruption rarely persists beyond the third day and is often completed in forty-eight hours, but may last longer.

The eruption almost always appears on the fourth day, sometimes earlier, sometimes later. The lesions remain in full efflorescence until the maximum is attained, usually during the sixth day, when they begin to fade with the beginning of defervescence. They are papular and tend to form crescentic groups, at least on the face, neck, and upper portions of the trunk. They are mostly of a dark raspberry color and are very irregular in outline. They may coalesce into patches of dusky redness. Rarely the eruption may be pale in color or more circular and discrete.

Faucial Irritation.

Sore throat is present in nearly all cases, but hardly ever occasions difficulty in deglutition. A punctate, or papular, or diffused eruption appears upon the faucial mucous membrane. This may precede the cutaneous eruption.

Sore throat is uncommon, yet from eighteen to twenty-four hours before the cutaneous eruption appears, there may be seen small, hempseed-sized papules and macules scattered over the faucial mucous membrane.

RÖTHELN.	MEASLES.

Complications.

Very unusual; when present, generally involve the respiratory tract.	Very common, generally involving the respiratory tract.

Desquamation.

But rarely observed and then as almost imperceptible branny scales.	Branny desquamation constant and lasting several days.

Careful consideration of the two diseases shows that while the general points of difference are decided, they will often fail to apply in individual cases. There is no feature of either affection that may not be sometimes observed in the other, whether it belong to the incubative, preëruptive, eruptive, or desquamative stages. This cannot be too much insisted upon, and to disregard it is to expose one's self to almost certain error. The incubative stage of rötheln may be brief, that of measles protracted; the preëruptive stage of the one may be lengthened, that of the other shortened; the catarrh of measles may be insignificant, that of rötheln pronounced; fever may be slight or intense in each disease; in both, the eruption may appear early or late and may run a brief or prolonged course. Departures from typical eruption may be observed in either, and the features supposed to be peculiar to one may, in reality, not seldom appear in the other. The faucial eruptions are not essentially different. Even the adenopathy supposed to be so characteristic of rötheln may be encountered in measles. Finally, desquamation may be absent in measles, it often occurs in rötheln. Klaatsch insists upon, as constant symptoms, conjunctival injection, redness of the fauces, and swelling of the lymph glands; but these symptoms offer no distinguishing characteristics. Are there, then, no peculiar signs upon which a diagnosis may be based with certainty? Considered separately, we must confess that there are none. Taken together, the symptom-complex would enable one to speak with perfect confidence only in presence of the following conditions, viz.: (1) The prevalence of an epidemic in which the history and symptomatology of the disease correspond to a type similar to that laid down in these pages, and (2) the infection of persons exposed to it quite irrespective of previous attacks of measles.

During an epidemic of measles, it must always be unwise to diagnosticate unhesitatingly, as rötheln, a single case in which the course and history of this affection may be observed; for, without doubt, such attacks often follow exposure to measles and communicate measles to others. On the other hand, in an epidemic in which the same course and symptoms are generally observed, and in which all exposed persons are attacked, irrespective of previous attacks of measles, the diagnosis of rötheln may be made with certainty. Between prevailing measles and prevailing rötheln there are differences that usually permit the pathological relationships of given cases to be determined without difficulty.

The symptoms typical of rötheln may also usually be recognized in those who have already experienced an attack of measles, even when occurring sporadically; but of isolated cases, occurring in those who have already had neither measles nor rötheln, one should not venture to speak of more than probability, though in many cases this may be done with some degree of confidence. If one makes the test for rötheln, in a person suffering from a measles-like attack, the fact that he has already had measles, as has been done formerly, and is again being done by some writers, he introduces an unscientific element into the study of the disease that *must* entail disaster. This conclusion appears almost inevitable when we consider that undoubted reinfections with measles are sufficiently known; for although older writers denied that such reinfections occur (Willan never saw them), later observers have shown that they are frequently encountered and that an individual has been known to undergo even a third attack.

Tryanski[1] noted in 200 cases of measles, 14 recurrences with intervals of from six months to seven years, the average being three years. Kassowitz reported reinfections in which the attacks closely resembled rötheln, but could be traced to exposure to measles, and from which measles was communicated to others. Similar experiences have also been reported by many other writers, among whom may be mentioned Hennig[2] and Schwarz[3] (who noted recurrence of measles in eight of sixteen cases, all with the exception of one case having both attacks under his own observation). In a recent epidemic of measles at the " Home of the Friendless," in Baltimore, under the writer's observation, of thirty-one children attacked with measles five had a return of symptoms within six weeks; in each case the second attack was exceedingly mild, presenting features that might perfectly well have justified a diagnosis of rötheln, with this difference, however: of all the children exposed only these five developed the second eruption, a result that would not have been observed had rötheln been the cause of it. These considerations, however, bear only upon the relations of sporadic cases of rötheln. Recurrent measles is uncommon, and is quite unknown as of epidemic occurrence.

There occur, it is true, in epidemics and sporadically, cases resembling measles and yet unlike it, attacking alike those who have had and those who have not had measles, yet in important particulars differing from all of the acute exanthemata as we now understand them.[4] Such cases,

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[1] Dorpat med. Zeitschr., 1873, iii.   [2] Arch. f. Kinderh., 1874-76, 8.
[3] Wien. med. Presse, 1876, 43-45.

[4] Cheadle, for example, has described an epidemic affecting many who had already had measles, the symptoms of which were remarkable for their intensity and presented peculiarities unlike those described by nearly all writers upon rötheln. If the patients had not already had measles, one would never have called the affection rötheln. It would even seem more probable that Cheadle treated measles in those who had already had rötheln.

it is said, cannot belong to measles, since those who have already had this affection are not protected. They are of uncommon occurrence, and eventually will probably prove to be bastard forms of measles or scarlatina, or possibly some as yet not understood disorder, or results of the concurrent activity of more than one specific affection; at all events, we are not justified in recognizing them as rötheln until clinical observation has demonstrated them to be such.

Scarlatina differs from rötheln in its shorter incubation, its violently febrile onset, the intensity of the throat symptoms, the peculiar condition of the tongue, the character and longer duration of the eruption and fever, the copious desquamation, and the peculiar complications and sequelæ. Mild cases of scarlatina may be mistaken for rötheln, but the diffused form of eruption in this affection can offer only difficulties, and even here the spread-out red patches always pass at their margins into the easily recognized pale maculo-papules that clear away doubt. Non-specific erythematous affections are so circumscribed, or are so evidently traceable to their exciting cause, that doubt can hardly arise unless the question of idiopathic roseola, epidemic roseola, etc., be raised. The difference here will be rather of words than of meaning, since there is little doubt that this affection and rötheln are identical. Occasionally maculo-papular medicinal rashes have been mistaken for rötheln, and the writer has known the adenopathy and eruption to be looked upon as syphilitic roseola and adenopathy at first.

TREATMENT.—Very little treatment is ever required; indeed, but few find it necessary to keep in bed or even within doors during the attack. Treatment may be called for when complications arise. Such accidents are rare, but when present must be treated according to their necessities and without special reference to the exanthem. As the contagious properties of rötheln are not pronounced, and as they are soon exhausted, isolation, should it be desirable, need not be as protracted as with scarlatina, smallpox, measles, etc.

CONCLUSIONS.—1. Rötheln is a specific, contagious, eruptive disorder.

2. While it possesses pretty well defined characteristics, which, taken together, justify a reasonable degree of certainty in its diagnosis, it has no symptom that may not be and is not often assumed by measles.

3. A sporadic case, occurring in one who has never had measles and who affords no history of exposure to rötheln, may be diagnosticated with a fair degree of confidence, but not with absolute certainty.

4. The unqualified diagnosis of rötheln should only be made during an epidemic in which all persons exposed, irrespective of former attacks of measles, are liable to be affected and in whom the symptoms follow a pretty uniform type. In the absence of a pronounced epidemic influence, a series of cases occurring in a household, a school, or an asylum,

showing typical symptoms, may be diagnosticated as rötheln with a fair degree of confidence.

5. In sporadic cases, where neither measles nor rötheln has been experienced, a diagnosis of probable measles or rötheln must be made, accordingly as the symptoms and course resemble the type of one or the other affection.

A final word of explanation and defence of the title under which this paper appears, is due. Most unfortunately the term *rubeola*, which in Germany, since the time of Hildebrandt, is universally adopted as the classical name for our affection, is to English-speaking races inseparably connected with the conception of measles. This has driven English-speaking writers to have recourse to the German word rötheln. To one unacquainted with the German language, this title is unmeaning, is not euphonious, and is a source of embarrassment. First employed by Werlhof, in 1759, it is now firmly established and definitely understood in Germany. Unable unqualifiedly to adopt "rubeola" and "rötheln," the medical public has hit upon "German measles" as designating the malady in question, and under this name it is becoming generally recognized. Yet this is a most unsatisfactory and unscientific evasion of the real issue, and implies a relationship which is not admitted. I would suggest, therefore, that the title first proposed, I believe by Veale, and afterward by Squire, and adopted in Quain's *Dictionary*, *rubella*, be accepted as the prime name of the affection; and as "German measles" is manifestly a most objectionable designation, I also suggest that the affection be popularly known as "epidemic roseola," a term that has the advantage of age, and that was undoubtedly originally applied to it, though under a different conception of its nature.

19 CATHEDRAL STREET.

ON SOME FORMS OF ALBUMINURIA NOT DANGEROUS TO LIFE.

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THE gravity of albuminuria as a symptom has been differently estimated at different times. It is not much more than a hundred years since Cotugno discovered the fact of its occurrence, and not much more than fifty years since Dr. Bright made out the relationship between it and the diseases of the kidneys which came to bear his name. For a long time after his discovery the utmost dread of the occurrence of the symptom existed in the mind both of the profession and the public, most people regarding its existence as unfailing evidence of grave organic

disease. But gradually it has come in recent years to be known that albumen often appears in the urine, even in considerable quantity and very persistently, in persons free from important organic malady. Indeed, it may be maintained that some patients with persistent albuminuria are yet eligible for life insurance at little, if at all, above ordinary rates.

It is important to know the characteristic features of these non-dangerous albuminurias. But they are so numerous, and require such careful discussion, that I could not do them justice in a single paper. I must. therefore, meanwhile set aside several varieties. Thus, I shall not take up the group which may be called accidental albuminurias, in which the albumen is accounted for by the admixture with blood, pus, spermatic or prostatic fluid. Neither shall I discuss the albuminuria associated with infective processes and high temperature, which is often seen in pneumonia, erysipelas, diphtheria, and the specific fevers. Nor shall I consider the albuminuria attending upon various nervous disorders such as exophthalmic goitre, epilepsy, and apoplexy, nor such forms as that which Claude Bernard produced experimentally by puncturing a point in the floor of the fourth ventricle. Nor shall I dwell upon the albuminuria which Dr. George Johnson has found to be so often induced by the health-giving exercise of cold sea-bathing. Nor, lastly, shall I speak of the form due to passive congestion from cardiac disease or vascular obstruction.

Such groups as these having been put aside, at least four categories can be defined, which, although they run into one another and mutually overlap, perhaps varying in the same individual from time to time, may yet with advantage be distinguished. These are, 1st, paroxysmal albuminuria; 2d, dietetic albuminuria; 3d, albuminuria from muscular exertion; and, 4th, simple persistent albuminuria.

I do not know whether this classification will ultimately turn out the most satisfactory, but I shall certainly be able to illustrate each of these varieties with cases markedly characteristic. In a few words I may explain the substance of what I deem the most important contributions to the subject in recent literature. Many years ago Sir Robert Christison pointed out that the use of certain articles of diet and luxury sometimes induces temporary albuminuria. Jaccoud[1] formulated the statement that there are cases of persistent albuminuria in which the patient is substantially in good health, and in which there is no kidney disease. He therefore distinguished between persistent albuminuria and albuminuria from Bright's disease. Dr. Moxon[2] gave definiteness to our ideas by his paper, published in 1878, on chronic intermittent albuminuria. He divided cases of this kind into two classes: 1st, the albuminuria of

[1] Nouv. Dict. de Méd., i., Paris, 1864. Quoted in British and Foreign Medico-Chirurgical Review, April, 1868, p. 325, etc.
[2] Guy's Hospital Reports, 1878, vol. xxiii., 3d series.

adolescents, in which the symptom continues during a long period in a
desultory and irregular way, so that in some it is rather occasional than
intermittent; 2d, remittent albuminuria, in which the albuminuria is in
greater quantity and occurs more constantly from day to day, especially
in the urine passed after breakfast, but is usually wanting in that passed
in the early morning. He further divided these remittent cases into
two groups, in one of which there is renal disease, in the other none.
With regard to the albuminuria of adolescence, Dr. Moxon pointed out
that it is a state of health to which young men are subject, which from
its frequency deserves a special name. The patient is out of condition,
listless, and languid, sleeps too much, and yet rises unrefreshed, is
anæmic, and gray and sunken about the eyes. It is simply a state of
debility without any organic disease. The urine is found to be at times
albuminous—most often after breakfast, while at other times it is quite
free from albumen. He had met with nineteen cases of it, and of the
seven cases he records two pairs of them were brothers, while another
brother in one of the families affected was under his care with a different
urinary abnormality—the persistent presence of a large excess of urea.
This paper, as I have said, defined our knowledge, but that the existence
of non-dangerous albuminuria was an idea familiar to acute physicians
may be shown by the fact that Sir William Gull had told Dr. Moxon
that in his experience albuminuria is almost as common in young and
growing men and boys as spermatorrhœa. Dr. T. Morley Rooke[1] drew
attention to the remarkable effect of rest in the recumbent posture in
removing or keeping in abeyance the albuminuria of adolescence, and
Dr. Burney Yeo[2] dwelt upon the importance of muscular exercise as a
cause, and of rest in bed and the effect of food and wine as means of
lessening the albuminuria.

Dr. Clement Dukes,[3] discussing the albuminuria of adolescence on the
basis of his experience as physician to Rugby, pointed out that it is
extremely common and presents a great variety of features, both in its
causation and special characters. Sometimes a sudden change in tempera-
ture, sometimes an error in diet, sometimes excessive exertion, sometimes
mental emotion induces it. He showed that sometimes the diet has no
effect, at others the most marked, so that a patient who has no albu-
minuria when taking milk may get it when he adds a little bread to his
diet, and one who, going about, requires to limit his food in the strictest
way, can eat and drink freely if he remains in bed. It may be per-
sistent for a very long time or it may disappear and reappear; it may be
absent at one time of the day and present at another.

I shall not detail anything of the important contributions of Mahomed,[4]

[1] British Medical Journal, 1878, vol. ii. p. 596.   [2] Ib., 1878, vol. ii p. 627.
[3] Ibid., Nov. 30, 1878, p. 794.   [4] Lancet, Jan. 18, 1879, p. 77.

Fürbringer,[1] Runeberg, Saundby,[2] Leube,[3] George Johnson,[4] Quain[5] and Semmola,[6] and Stanley Rendall,[7] but pass at once to a communication by Dr. Pavy,[8] made at the British Medical Association meeting in 1855, in which he suggests the name cyclic albuminuria and gives interesting details of 'a number of cases. He describes the diurnal appearance and disappearance of the albumen very much as Dr. Moxon did. There may, he says, be considerable variation in the amount of albumen on different days. It may go on for weeks, months, or years, without impairment of health. There may be sharp, unduly forcible cardiac impulse, but the pulse is soft, not hard and sustained. There is nothing, he says, to show that it is an early stage of Bright's disease or that it leads to any serious disorder. The urine is otherwise normal as a rule, with no casts, but occasionally sugar has been detected, while oxalate of lime crystals are frequently present. The age of patients observed varied from nine to forty-nine. Three cases were in children aged nine, eleven, and thirteen respectively, two boys and one girl. Dr. Pavy offers no theory, but compares the condition with some analogous phenomena of a diurnal character. Thus in the phosphatic diathesis the urine may be normal in the early morning, whilst for a few hours after breakfast it is turbid from the presence of phosphates, becoming clear again in the afternoon and remaining so till after breakfast next day. There is also a diurnal variation in the temperature of the body. Thus a physiological cyclic change exists of which other illustrations could be adduced. This paper has given fresh impetus to the study of these cases.

Dr. Maguire,[9] in an able and interesting communication, has suggested that we may recognize three classes of functional or cyclic albuminuria: 1st, those accompanied by general languor, low tension pulse, and no deposit of uric acid in the urine; 2d, those with robust health, pulse of high tension, frequently some dyspepsia, and a copious deposit of uric acid; 3d, rare cases in which some abnormal albumen is present in the urine.

Having thus given an idea of some of the chief recent observations on this subject, I proceed to describe and illustrate our four varieties.

I. *Paroxysmal Albuminuria.* I shall perhaps best convey an idea of the features of this form of albuminuria if I describe a typical case which I studied in the wards of the Old Infirmary. A young woman

[1] London Medical Record, 1880, pp. 449 and 450.
[2] British Medical Journal, May 10, 1879, pp. 699 and 700, and June 5, 1880, pp. 841–843.
[3] Lancet, 1878, vol. i. p. 501; 1881, vol. i. p. 468; and Medical Times and Gazette, Nov. 9, 1878, p. 546.
[4] British Medical Journal, Dec. 13, 1879, pp. 928–930.
[5] Lancet, Jan. 18, 1879, p. 86.   [6] Ibid., Oct. 18, 1879, p. 583.
[7] Étude sur l'Albuminurie alimentaire, Thèse pour le Doctorat en Médicin, Paris, 1883.
On Cyclic Albuminuria, British Medical Journal, Oct. 23, 1885, p. 789.
[9] Lancet, June 5, 1886, p. 1062, and June 12, 1886, p. 1106.

was admitted on account of acute illness. She had general *malaise*, some degree of fever, and gastric catarrh, but on examination, nothing further could be discovered amiss excepting that the urine was rather scanty, dark in color, and was loaded with albumen. The microscope showed tube casts in great number and of several varieties—epithelial, granular, and hyaline. There were also some crystals of oxalate of lime. There was a degree of puffiness of the face, but no dropsy, and, notwithstanding the urgency of the renal symptoms, I ventured to express the opinion that the illness would prove transient and unimportant. My reasons for so doing were the suddenness of development of the renal symptoms and the discrepancy between them and the general condition of the patient, and the opinion was further confirmed when it transpired that similar attacks had previously occurred and had speedily passed off. The next day the patient was much better; the albumen was disappearing, the tube casts were no longer so numerous, and before many hours had elapsed she was quite well.

This form of albuminuria stands in very interesting relationship to what is called paroxysmal hæmatinuria or hæmoglobinuria, a disease which is ascribed by many to a morbid action of the liver. The patient in the intervals between the paroxysms may appear to be in good health. The attack begins with a slight feeling of chilliness, or a rigor attended by some uneasiness in the region of the liver and in the small of the back. The urine is of a dark color, due to the presence of blood pigment. As a rule, the color is due simply to hæmoglobin, but sometimes blood corpuscles may be detected in the freshly passed urine. They, however, even when present soon break down, and the blood pigment is liberated. There is, therefore, in this disease a hæmolytic process, a destruction of red blood-corpuscles probably due to some temporary derangement of the liver, and the liberated pigment is discharged by the kidneys. A single micturition may discharge all the hæmoglobin which has been set free, or it may appear during two or three micturitions. Now I think I may more clearly bring out the close relationship which exists between this disease and that which I have called paroxysmal albuminuria, by relating a case described by Rosenbach.[1]

A little boy, seven years old, after a severe fall from a wagon, became subject to attacks of periodical hæmoglobinuria. The attacks occurred pretty frequently, and exhibited the features common in the disease. The most interesting point for our present purpose it that at the beginning of each attack, before the hæmoglobin appeared, the urine became albuminous. This is by no means an exceptional circumstance; indeed, it will be found in many cases of hæmoglobinuria. It is probable that the

process originates either in the nervous system, inducing a morbid action of the liver, or in a primary affection of that gland; and that it causes blood changes which irritate the kidneys, giving rise to a transient inflammatory action during the process of elimination of the waste products. Whether this view of the pathogenesis of the process be correct or not, the clinical relationship of hæmoglobinuria to the form of albuminuria we are now discussing is unmistakable. The relationship is rendered the more distinct by their etiology, for, like those of paroxysmal hæmoglobinuria, the attacks of paroxysmal albuminuria are apt to be brought on by cold and wet, sometimes by errors of diet and alcoholic intoxication.

The characteristic features of this group of cases are easily recognized. The sudden and copious occurrence of albumen in the urine with numerous casts, the process lasting only a short time and recurring at intervals with or without a perceptible exciting cause, will justify you in diagnosticating the condition.

What view are we to take as to the explanation of the process? Is it to be referred to changes in the secreting structures, in the bloodvessels, or in the blood itself? Considering that we have so marked a discharge of casts and epithelial cells, it is obvious that we must admit changes in the secreting structures. Alterations in the blood pressure may exist, but only as a secondary element. Changes in the blood itself, although not demonstrated, are, in my opinion, extremely probable, and they most likely induce the alteration in the kidneys. Irritation of the kidneys from blood changes is a very common phenomenon. It must frequently have been noticed how, in cases of many varieties of jaundice, albumen, and tube casts appear in the urine, and this evidently as a result of irritation of the kidney by the products of the hepatic disorder. In cases of oxaluria a similar change, probably depending upon a corresponding cause, has been noticed. The analogy with the hæmoglobinuria process supplies another consideration in favor of the view. Thus is clearly seen the hypothetical explanation which at present commends itself to my judgment.

If this view be correct, it is obvious that our treatment in such cases should be directed, on the one hand, to the avoidance or diminution of renal irritation, and on the other, to the regulation of the hepatic function and of the chemical processes in the body. Happily, the attacks are usually of brief duration, and I have never known them prove permanently injurious. The chloride of ammonium is the remedy in which at present I put most confidence. It must, of course, be given with due regard to the avoidance of renal irritation.

II. *Dietetic Albuminuria* is a variety which has long been more or less distinctly recognized. Some people suffer from it whenever they indulge in certain articles of diet. In some cases one kind of food, in others

many require to be proscribed ; cheese, pastry, and· eggs are among the more common offenders.   My first experience of such cases was obtained when I was resident in the Infirmary.   A member of the staff used sometimes to make his appearance with a pasty, puffy condition of eyelids, and he found that this was associated with albuminuria.   His albuminuria proved to be dietetic.   If he indulged in even a moderate amount of cheese or of pastry the symptom was pretty sure to arise. Such a passing and temporary albuminuria always and exclusively following upon error of diet is easily made out and avoided.   On the other hand, there are some cases in which the albuminuria is little, if at all, determined by the kind of food, but the entrance of food of any sort into the stomach suffices to induce the symptom ; and there are many in which the food determines the occurrence of albumen, and in which, nevertheless, some other factor plays an important part in its production. In dietetic albuminuria we must, therefore, recognize at least these three factors as possible exciting causes : first, the use of certain kinds of food ; second, the entrance of food (of any kind) into the stomach ; and, third, one or both of these, in association with other influences, such as exercise or time of day.   It will be readily gathered from the examples to be described, that each of these factors has very different amount of influence in different cases, the symptom being almost entirely due to one in some cases, to another in others.

I shall illustrate this variety by a negative and a positive instance. A gentleman consulted me some years ago on account of albuminuria. and when I was searching for the cause it transpired that his dietetic habits were such as might well have accounted for the symptom.   He was accustomed to a luxurious table, and acknowledged a special partiality for cheese.   I asked him which were his favorites.   He named Stilton, Rochefort, and Gorgonzola.   I inquired as to the quantity, and he indicated an amount three inches long, an inch and a quarter broad, by at least an inch thick.   I expected that this would prove to be an important causal element in his case, and after various other experiments I directed him to take a good piece of one of his favorite cheeses, but found that no albuminuria existed.   Indeed, I found that diet had little or no effect upon his urine.   On testing it after dinner on one occasion I found that, although the meal had included a good allowance of *pâté de foie gras*, chicken croquets, roast pigeon, with spinach, gooseberry tart, and a pint of Marcobrunner, the urine was normal.   On another occasion, when a Welsh rarebit constituted part of the meal, a like result appeared.   I found also that a breakfast of fried sole, a cup of coffee with milk, and a pint of milk with bread did not produce albuminuria, and a sumptuous luncheon was alike inoperative.   The only food which seemed to induce the albuminuria was new hot bread.   Thus, it was clear that my first impression was wrong, and that the albuminuria

in this case was not of dietetic origin. I shall show further on what its cause really was.

I shall now refer to a case in which a positive effect was apparent. The patient, then a medical student, called upon me first in the autumn of 1881, complaining of headache and dyspepsia. The heart's action was not satisfactory, but gave no indications of structural change either in the organ itself or in the kidneys. There was distinct, although not copious, albuminuria, unattended by tube casts or other token of organic renal disease. I ordered him a mixture containing chloride of ammonium and tincture of perchloride of iron. In the course of a week the albumen had diminished to a faint trace, and by the end of a fortnight it had disappeared entirely. It did not recur until the following summer, when his vigor was reduced, owing to the work for the final examination and to anxiety in connection with the death of his father. It was then observed that, although not present in the morning urine, there was a distinct trace directly after food entered the stomach. The rapidity of its onset was very remarkable. As soon as food of any sort was taken albumen began to be discharged by the kidneys. Being by this time a well-educated medical man, he was much interested in this circumstance, and found by experiment that if after commencing a meal he passed a little water, it was sure to be albuminous, although that passed a few minutes before was not. But in this case the symptom was influenced by the season of the year and the time of the day. It occurred only in summer and, while easily induced in the morning or at midday, it never appeared during the evening or at night. It had its special periods, but even during them the ingestion of food was the determining element. The breakfast and the midday meal always produced it, but never was a trace discoverable in the evening, whatever food was taken. The nature of the diet had at all times very little effect. If he lived upon rich food the albuminuria became no worse. If he made Revalenta Arabica and such like substances, his diet, it appeared all the same. Even a milk diet seemed to produce no favorable effect, but he could not persevere in its use, as it did not suit him.

The results of exercise were carefully tested. They were found distinct, but much less marked than those of food. If he fasted of a morning, no amount of exertion induced the albuminuria. But if, when the albuminuria had been induced by eating, he took exercise, its quantity at once greatly increased. On the other hand, as with food, exertion failed to produce it during what I may call the non-albuminuric portion of the twenty-four hours.

There never were any tube casts, but oxalates were frequently present. The urine was occasionally high colored, never bloody, sometimes deposited urates, but never uric acid. He never had pain in the back or other local symptoms to draw his attention to the renal functions.

The albuminuria has recurred each summer till this year, but in 1885 it was very slight, and this year has passed as yet without its appearance. The last specimen of urine examined was natural in color, specific gravity while warm, 1.020, distinctly acid, and contained no albumen or sugar. The condition of the heart is the same as it was in 1881. The state of the vessels is also the same as before, with perhaps a little increased tension. The walls of the radials are distinctly thickened. When the albumen was present there was always, he says, some intermission of pulse, but this has continued during the last year although the albumen has been absent.

By way of treatment, various plans were tried. Arsenic failed entirely. Iron produced little benefit. Spinal douches of cold water falling from a height of eight feet did much good. But, on the whole, nothing proved so serviceable as the combination of iron with chloride of ammonium.

Summing up the facts ascertained in this case we find—

1. That albuminuria occurred only after ingestion of food.

2. That it occurred in summer and at certain periods of the day, viz., after breakfast and after the midday meal—never before breakfast or in the evening.

3. That its onset was sudden, setting in as soon as food reached the stomach.

4. That the nature of the diet appeared to have little or no effect.

5. That exercise had a decided effect, but only secondary to that of food.

6. That the albuminuria was worse after mental excitement.

7. That cold douches applied to the spine checked, while cold sitz and Turkish baths (without the cold douche) increased the albuminuria. If, however, he took either a Turkish or a cold sitz bath in the morning when he had no albuminuria, neither of them produced it.

8. That counter-irritation to the loins by mustard or croton oil did not at all diminish the albuminuria, but rather increased it.

9. That, as regards medicines, arsenic had no effect, and while iron proved slightly beneficial, chloride of ammonium was much more efficient.

The first question which arose as to diagnosis in this case was whether Bright's disease existed or not. The state of the vessels, in respect both of their walls and tension, might have corresponded to this, and the heart's action was such as one sees occasionally in renal cases. But there had never been a trace of dropsy, there were no tube casts, the specific gravity was good, and the albuminuria came and went. Therefore, there was manifestly no inflammation of the tubules. The quantity of the urine, the specific gravity, and the absence of consequent complications, such as the retinal changes, excluded a diagnosis of cirrhosis

while there was no polyuria, or any causal or concomitant complications fitted to suggest waxy disease. It was also certain that the albuminuria was not an accidental result of disease of the urinary tract. I therefore concluded that it belonged to the category of unimportant albuminurias and gave from the first a correspondingly favorable prognosis. It was only later that all the facts which I have mentioned became known to me, and now, surveying them, it is clear that we have to do with a form of albuminuria mainly dietetic, although influenced in an important measure by season and time of day, and in a minor degree by exercise.

Deferring what I have to say regarding the causation of dietetic albuminuria, I must express the wish that I could throw definite light upon the curious annual and daily cycle observed in the case—not a cycle of albuminuria, but a cycle of capacity for dietetic albuminuria. With our present knowledge, speculation on this subject is, however, not profitable.

This patient's constitution is peculiar, combining a marked nervous excitability with a tendency to hepatic derangement. He is liable to mental depression—often suffers from what he calls an ill-defined dread. His complexion is sallow, especially during what he terms his bilious attacks. These are attended by general malaise, headache, catarrh of stomach, irregularity of bowels, and functional disturbance of the liver. He is greatly impressed with the value of chloride of ammonium in the treatment, not only of his renal, but also of his nervous symptoms and his digestive disorders.

In order, then, to clear up the diagnosis in a case of supposed dietetic albuminuria, it is necessary to experiment with various articles of diet, and watch the result.

What explanation can we offer of this form of albuminuria? Obviously it cannot be due to primary change in the secreting tissue, for, although albumen may be very copious, there is no discharge of tube casts or renal epithelium. A chemical alteration of the albumen of the blood, or of its condition in this respect, naturally suggests itself. In regard to the point of these suppositions, however, it must be noticed that it it is ordinary serum albumen that is effused, and not, so far as I have seen, any special form. I admit that there may be an undue tendency to the formation of acid albumen or alkali albumen, but this is certainly not the rule. One can understand how, with faulty chemical processes within the body, digestion of nutritive substances and transformations of albumen might be abnormally altered, and albumens more capable of transudation produced, but of the real existence of such a process I know of no sufficient evidence. The excretion of more diffusible forms of albumen, such as propeptone and peptone, is, of course, known to be of not infrequent occurrence, and it may, in some

cases, be related to digestion, but at present we are studying cases in which the ordinary forms of albumen—serum albumen and paraglobulin—are met with.

Apart, however, from any problematic change in the nature of the albuminous constituents of the blood, we have to consider the second stage positively. It is definitely known that changes in some of the other blood elements exert a marked influence upon the filtration of the ordinary forms of albumen. Hoppe-Seyler and others[1] have shown that the quantity of albumen which passes through a filter increases with the increase of the saline constituents. Chloride of sodium is the most efficacious, but nitre, chloride of calcium, and even urea, exert a certain influence. We can readily conceive that, after a meal, the salts of the blood may be increased; it seems possible that this very transudation of the albumen may be induced. The whole question of the influence of salts on the circulation is very interesting. If the attempt be made to pass fluids of various kinds through the vascular system of the kidneys of animals recently killed, it must be granted that it is much easier to pass one rich in salts than simple water. But to this subject I shall allude more in detail on another occasion, and I would say, meanwhile, that, although the fact as to diffusion is well established, its applicability in the explanation of these cases is not yet demonstrated.

While, however, giving these suggestions toward chemical explanations due weight, I cannot but advert to the possibility of reflex vascular influence being at work. We may conceive that, on the entrance of food into the stomach, the terminations of the vagi may be morbidly influenced, or that the nerves supplying the renal vessels respond abnormally to a normal peripheral impression. I have already accentuated the fact that the friend, whose case I have last described, says that as soon as food reaches his stomach the albumen appears, and that the nature of the food ingested makes no difference. One can scarcely suppose that sufficient time has elapsed for absorption, chemical alterations, and excretion, and it seems reasonable to suspect that an influence exerted on the vessels through the nervous system would have more chance of bringing about the result within the time. While throwing out these suggestions, I must admit that our present knowledge does not suffice to afford a satisfactory explanation.

As to the treatment, there is little to be said excepting that such patients must not only be careful as to diet, but scrupulously attentive to all hygienic laws; and that certain remedies, such as the chloride of ammonium or arsenic, may prove eminently serviceable. I should advise looking carefully for evidence of faulty digestion due to defects of different glands subserving the process, and ascertaining whether we can

[1] Senator on Albuminuria, New Sydenham Transactions, pp. 97–98, 1884,

discover disorder in the stomach, the duodenum, the liver, the pancreas, or the small intestines. It may be found that only one of them is at fault, and remedies may be applied accordingly. Further, what I have said will suggest the thought that in some cases there may be, not only a digestive, but a nervous influence at work, and that the latter may actually be the main factor in the case; this also may serve as a guide in determining the treatment.

III. I shall now illustrate *albuminuria following upon muscular exertion*, and shall describe its features by narrating a case at present under my care. The patient is a girl, thirteen years old. A sample of her urine, passed on rising at 7.30 A.M., when tested with nitric acid, is seen to contain no albumen, or only the very faintest trace. But the urine passed an hour later, after dressing and moving about the house, but before any food had been taken, is highly albuminous. Thus the getting up is followed by this extraordinary and marked albuminuria. The history of the case is as follows : Her previous health is reported to have been good. About last Christmas, while at a boarding-school, she had an attack of diphtheria which is, like scarlatina, a not uncommon cause of albuminuria by the production of inflammatory Bright's disease. She, however, did well, and went through the whole illness without a trace of albumen appearing in the urine. I can say so with confidence, as I know that particular care was taken in regard to its examination. When, however, she was convalescent, and was getting up and going about the house (but not getting out), albumen was detected. This does not correspond to the ordinary clinical history of albuminuria connected with diphtheria. As a rule, it appears during the attack, or on exposure to cold, within a few days of its subsidence. My own experience in this matter is confirmed by that of others. Dr. John Abercrombie,[1] for example, says that while he has seen it occur within twenty-four hours of the first symptoms of diphtheria, he has never seen it commence later than the tenth day of the disease. During January, a few tube casts were found on two occasions, and sugar was present once or twice in small quantity. At first no peculiarity was observed as to the albuminuria, and so it was of course believed to be constant, and regarded as a result of renal disease due to diphtheria. It was only after some considerable time that it was discovered that the urine passed on getting up in the morning, and also that passed during the night, contained no albumen. This fact was noticed the first time the urine of these periods of the day was separately tested, and from inquiry I find that, although the peculiar periodicity was only then observed, it may have existed from the first, and I think the history and progress of the case make it most probable, in fact almost certain, that it did so. I have said that

traces of sugar were sometimes discovered in the early period of the illness. No trace of it has ever been detected since the patient came under my care, nor have there been any casts. In a specimen passed on rising, however, we found for the first time a well-marked layer of oxalates deposited on the top of the mucus, and under the microscope octahedral crystals of oxalate of lime were seen in very large numbers. Curiously, in another specimen passed an hour later, there was not a single oxalate crystal; the urine had become alkaline, and there was a pretty copious deposit of triple phosphates.

This patient has now been for a considerable time under my observation, and I can give some interesting details as to the features of her albuminuria and as to some experiments which we have made regarding it. I have already pointed out that the urine passed on rising—and the same has been true, except on one or two occasions, of that passed during the night—contains no albumen or only the merest trace. Now while she is up the albumen is constant, though once or twice toward evening the quantity has been small. But facts as to the daily cycle of the albuminuria are, that the quantity is, as a rule, largest in the morning in the urine passed before breakfast. I have many times examined samples passed forty-five minutes after she got up and before she had taken any food, and have found the albumen in them to be very copious. It would appear, therefore, that the moment she gets up there is a sudden onset of albuminuria, so that this case forms, in this respect, an interesting parallel to that which I have described in the dietetic group, in respect to suddenness of onset, although due to a different cause. During the forenoon the albumen has several times been observed to become distinctly diminished in amount. Sometimes, though not so often, it is in largest quantity later in the day—e. g., during the afternoon or the earlier part of the evening.

I have further tested the conditions of the albuminuria by experiment. On one occasion she remained in bed a whole day and two nights— about thirty-six consecutive hours, keeping her ordinary diet during the time. The result was that the albumen scarcely appeared. Indeed, there was in only one of the samples passed during that period anything more than a mere trace, and in that sample the quantity was small. Curiously, in the urine passed that night after she had been all day in bed, albumen appeared in small quantity. In that passed in the morning there was a mere trace. She then got up and in the urine passed forty-five minutes after, the albumen was found to be present in large quantity,—distinctly larger than it had usually been before. It was again present in small quantity the following night, and there was a distinct trace on rising the next morning. After that, the former cycle became reëstablished. Thus the rest in bed, though it greatly diminished, did not entirely prevent the albuminuria; and it was followed by

an increased elimination of albumen when she got up, and a disturbance of the ordinary diurnal cycle. A corresponding result was elicited upon another occasion when the same experiment was tried.

On another occasion an experiment of an opposite kind was made. She was asked to rise at 5 A.M., dress and walk about the house for three-quarters of an hour. The urine passed on rising was free from albumen, whereas that passed forty-five minutes later contained abundance of it. She then lay in bed till 7 A.M. and the urine passed at that time contained no albumen or only a mere trace. She got up, and by 7.45 the albumen was again abundant.

On another morning she was asked to lie in bed and to move about the arms and legs, thus taking exercise in the recumbent posture. This she did for twenty minutes, and the astonishing result was that the urine passed after the time of exertion was, like that passed before it, perfectly free from albumen.

The next morning she was subjected for twenty minutes to very efficient massage in bed, but neither before nor after it did albumen appear.

A warm bath proved equally inoperative. Experiments were also tried with different kinds of diet, and they turned out to have very little effect. She was fed for several days exclusively on milk. It had a marked diuretic effect, and so, the urine being increased, the albumen seemed diminished, but the diminution was merely relative, not absolute. The subsequent addition of an egg daily and some bread and butter to the diet did not produce any evident increase in the albumen. Nor did it increase when ordinary or even rich diet was prescribed.

I have put in a tabular form, on the next page, the most important points connected with the urine in this case. The first table shows the patient's usual cycle, the second the cycle as influenced by experiment. From these experiments it is obvious that the change from the recumbent to the erect posture is at least the main factor in the production of the albuminuria, remarkable as that may appear. Diet has only a very slight effect, and the condition contrasts strikingly with that seen in the dietetic case which I have described. This case also differs from most if not all the so-called cyclic cases which I have seen recorded, in respect to the suddenness of the onset of the albuminuria. In them it commenced, as a rule, gradually and increased during the earlier part of the day, then gradually diminishing toward night, flowing and ebbing like the quiet tide, whereas in our case, though the diminution is gradual, the onset is sudden and abrupt like the tidal wave which is seen in certain rivers.

I have now related most of the facts of the case and will next discuss the question, What is the nature of the albuminuria from which she suffers? Is this young lady affected with, as was at first assumed, a

TABLE I.—REPORT OF EXAMINATIONS OF URINE IN CASE OF ALBUMINURIA FROM EXERCISE, BEGINNING WITH JUNE 20TH.

	Specific gravity.	Reaction.	Albumen Quantitative estimation by Dr. Oliver's percentage method.	Percentage of bile salts normal = 100 per cent.	Urea in grains.
June 20th.					
7.45 A. M.	1023	Distinctly acid.	Trace.	240 or 200	110.6316
8.50 A. M. Before breakfast .	1013	Faintly alkaline.	0.133 per cent.	300+	2.757
10.30 A. M An hour after breakfast.	(Below average.)	Slightly alkaline.	Less than 0.05 per cent.	300	17.89426
6.30 P. M. After dinner and tea	1029	Faintly acid.	0.13 per cent.	240	38.67
9 P. M. Going to bed . .	1026	Decidedly acid.	0.06 per cent.	150	66.102
Total	......	....	....	......	236.0548
June 21st.					
Night	1011	Distinctly acid	Trace.	100	58.93674
7 A M.	1016.5	Acid.	Very slight trace.	166	64.8
10 30 A. M	1017	Very faintly acid.	0.24 per cent.	300	24.25

Neither sugar, peptones, nor bile pigment present in any of the specimens.

TABLE II.—URINE, BEFORE, DURING, AND AFTER THE EXPERIMENT OF RISING AT 5 P. M., GOING TO BED AGAIN AT 5.45, AND RISING AGAIN AT 7 A. M.

	Specific gravity.	Reaction.	Albumen. Quantitative estimation by Dr. Oliver's percentage method.	Percentage of bile salts normal = 100 per cent.	Urea in grains.
June 22d.					
9 P. M.	1027	Acid.	0.08 per cent.	240	69.267
June 23d.					
Night	1020	Slightly acid.	Faint trace.	166 or less.	72.5933
5 A. M.	1019	Acid.	Almost imperceptible.	166	29.388
5.45 A. M. Arose at 5 A. M. .	?	Acid.	0.05 per cent.	300	5.6038
7 A. M. In bed since 5.45 .	1013	Acid.	Scarcely perceptible.	240 or 200	17.04713
7.45 A. M. Up since 7 A. M. .	1009	Neutral.	0.06 per cent.	183 (?)	4.4361
2.30 P. M.	1023	Slightly acid.	0.3 per cent.	200	41.40092
9 P. M. Going to bed . .	1027	Strongly acid	0.16 per cent.	183	81.13725
Total	......	....	....	......	251.60650
June 29th.					
Night	1012	Acid.	Faint trace.	150	99.2715
7 A. M.	1024	Acid.	Very faint trace.	240 or 200	36.1269
7.45 A. M. Still in bed, before breakfast.	1024	Acid.	Very faint trace.	300	6.6111

No sugar, peptones, or bile pigment in any of the specimens.

hopeless chronic Bright's disease which must almost inevitably send her to her grave before she is twenty, or has she merely an unimportant albuminuria without organic disease, which may, perhaps, disappear when she gets past her present critical period of life, and at all events gives no ground for anxiety? From a careful study of the case, I am convinced that the latter is the correct diagnosis. The grounds upon which I have formed this opinion are:

1st. That there is a period in every day in which the urine is free from albumen;

2d. That the quantity of urine and of urea is normal;

3d. That except on two occasions no tube casts have ever been found; and,

4th. That there is no symptom except the albuminuria at all fitted to suggest the idea of organic renal disease.

I shall now recur to the case of the gentleman regarding whom I have already given some details. The patient is between twenty and thirty and has travelled very extensively, riding and walking a great deal. The earliest symptom of which he complained was a painful uneasiness in the calves of his legs. The most careful examination afforded no evidence of disease in any part of the body, some degree of dilatation of the stomach and the abnormality of the urine alone excepted. On June 5, 1885, I examined six specimens of his water. At 7.30 P. M. the albumen was copious; at 8.50 it was very distinct; at 9.30 A. M. there was a trace; at 10.30 it was distinct; at 12.30, copious. There were no tube casts and the amount of urea was normal. A few days later, after he had recovered from the fatigue of a long journey, I found at 1.50, 3.40, and 5.45 P. M. no albumen; at 7.30 a trace; at 8.30 A. M. a very slight trace; at 10 A. M. a slight trace. I have already pointed out that diet even of a rich, varied, and ill-chosen sort produced no albuminuria. On the other hand, walking, especially walking up hill, induced the symptom. He lived in a hotel in Princes Street and could walk to Charlotte Square with little or no effect on the urine, but if he took a walk to the Calton Hill, the Castle, or Arthur's Seat, the albumen became copious. With rest it gradually disappeared. Carriage exercise seemed to produce no unfavorable effects. Massage, which had been very carefully tried, being thoroughly carried out for forty or fifty minutes by a most competent rubber, was also without result. I tried the effect of exercise in a sitting posture. He sat in his chair and played the banjo for an hour and then used his dumb-bell fifteen minutes. The urine passed immediately afterward was normal, but that voided half an hour later contained albumen. I did not think of trying the effect of muscular movement when he was lying on his back. It was however abundantly clear that muscular exertion, and particularly active walking exercise, was the chief exciting cause in this case also. I need

not again go over the reasons which led me in this case also to give a favorable opinion.

As to the origin of the symptom, it is worth noting that in his travels he once walked through Asia Minor in a wonderfully short space of time, and it was during or after this feat that the albuminuria was first observed. It is very probable that the great strain on his system which his feat implied was the starting-point of the albuminuria, which subsequently, when the damage had been done, could be induced by a much less amount of exertion.

Passing from the illustrative cases, I shall now direct attention to certain other points of interest:

1. The kind of albumen discharged has recently received some attention. Dr. Maguire[1] has recently published the results of investigations as to the forms of albumen met with in different diseases, and he concludes that the less grave the case the greater is the amount of paraglobulin in proportion to the amount of serum albumen. In three cases of cyclic albuminuria he found that the albumen present entirely, or almost entirely, consisted of paraglobulin. In a case described as one of anæmia with albuminuria, due in all probability to fatty degeneration of the kidney, both serum albumen and paraglobulin were present, but the latter was in much greater quantity than the former, while in Bright's disease the proportion of these two substances was reversed. On examining very carefully into this question, in the case of the young lady, the serum albumen was found to be in greater quantity than the paraglobulin, and, as it was certainly functional, I cannot admit the universality of Dr. Maguire's conclusion.

2. Another observation as to the kind of albumen present has been made by Dr. Pavy. He finds that sometimes it is not ordinary serum albumen, but alkali-albumen. I am not in a position to confirm this statement from my own observations, but I have been struck with the facility and speed of formation of acid albumen, very slight quantities of acid sometimes preventing coagulation by heat.

3. No peptones, or any other body of that group, have been found in our case, and very little is said of them in cases recorded by others. I observe, however, that Dr. Oliver,[2] of Harrogate, has met with an instance of intermittent albuminuria, in which peptones replaced the albumen for a time.

4. My patient, though she had no distinct œdema, had a pale, puffy-looking face. This was, I believe, due partly to a general morbid condition of the vessel walls, and partly to the anæmia which often accompanies this affection.

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[1] Lancet, June 5, 1886, p. 1062, and June 12, 1886, p. 1106.
[2] Articles in Lancet, 1885, vol. i.

5. Occasionally sugar is found. It was detected early in the illness by good observers in both the cases just described; and this fact, as will be seen, lends support to the hypothesis that faulty metabolism may have to do with the production of the albuminuria in such cases.

6. Other chemical changes also occur. Thus phosphates may be present in addition to, or alternately with, the albumen.

7. Urates are sometimes very abundant, and sometimes uric acid is present in considerable quantity.

8. The most common of all the additional chemical abnormalities is the presence of oxalates. They occur, at least occasionally, in a large proportion—I should say in the majority—of cases. It is found that ordinary oxaluria sometimes leads to temporary albuminuria and the presence of tube casts probably by irritating the renal tissues; but, in addition, it should be observed that oxalates very frequently appear in the course of the cases we are considering.

9. The bile salts have been found present in very considerable excess. In the case recorded by Dr. Oliver, to which I have already referred (which may, however, have belonged to the dietetic group), this was so. In the urine they have also been present in marked excess, and my friend, Dr. Stevens, who has devoted much attention to this subject, observed that there has been a diurnal cycle in their excretion corresponding, in the main, to the cyclic character of the albuminuria. This was very distinctly made out when the patient was on ordinary diet, and nothing was done to disturb, in any way, her daily routine of life. The urine passed at night usually contained little more than the small quantity which one expects to find in the urine of healthy individuals. In the urine passed on rising they were in excess, still more in that passed before breakfast, at which time the quantity sometimes reached its maximum for the twenty-four hours. The amount, as a rule, kept up during the day, and diminished toward evening. One interesting fact thus brought out is that the excretion of bile salts began to increase during the morning before rising, so that, whereas the albuminuria appeared to be due to exercise in the upright posture, and to be little influenced by anything else, the excretion of the bile salts was partly influenced by exercise, but partly dependent on some other factor. This is further shown by the circumstance that when she was kept in bed for thirty-six hours the diurnal cycle in their excretion continued to be observed. The appearance of albumen was accompanied by an increase in the quantity of bile salts present.

I may further state that a diurnal variation has been observed by Dr. Oliver[1] in the secretion of the bile salts in health, and his result may be broadly stated to be that the quantity increases during fasting

[1] Lancet, 1885, vol i., and Bedside Urine Testing, third edition, p. 225.

and diminishes during digestion—falling rapidly after meals.   But in
this patient's case this is entirely altered.   The night urine, during
fasting, contains the smallest quantity of all.   No doubt it increases
toward morning, and still more when she rises before breakfast; but
then the quantity keeps up during the day while digestion is going
on, and only falls again toward night.   A similar change was observed
by Dr. Oliver.[1] He found that when albuminuria occurred after a meal
the bile salts were excreted in increased quantity, whereas if at any time
albuminuria did not occur after a meal the excretion of bile salts was
within the normal range.   It will be observed that Dr. Oliver found this
change in the discharge both of albumen and of bile salts to stand in
relation to the diet, whereas in our case it is related to exercise.   The
two cases are, therefore, not similar, the one being an albuminuria from
exercise, the other, as stated by Dr. Oliver, being of hepatic origin.
We have in this altered excretion of the bile salts an indication of some
morbid change in the chemical or absorptive processes which I shall
discuss later on.[2]

10. The presence of a normal amount of urea and the general ab-
sence of tube casts are specially worthy of our notice.

We have now to ask ourselves what explanation our present knowl-
edge enables us to give the cases of this class.   While it must be at
once conceded that changes of a gross kind in the secreting renal tissues
are not very probable, it might be held that molecular alterations of
the cells in the Malpighian tufts dependent upon congenital pecu-

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[1] Lancet, June 13, 1885, p. 1078.

[2] Until recently our only method of detecting the bile salts in the urine was that of Pettenkofer by
sugar and sulphuric acid.   This method, however, owing to the necessity of first extracting the bile
salts from the urine, though it might be satisfactory in the hands of chemists, was impracticable as a
clinical test.   Dr. Oliver, of Harrogate, has devised a method free from this objection, and by which a
quantitative estimate can be made.   It depends on the fact that the bile salts precipitate albumen or
peptone when the fluid is of the requisite degree of acidity, and the test is done in specially graduated
tubes with a standard solution of peptone acidified to the proper degree by acetic acid.   The solution
is, however, difficult to prepare and, if much used, comes to be expensive.   A simpler qualitative
method, depending on the same property of the bile salts, but requiring no special reagent, has been
devised by Dr. Stevens (Ettles Scholar for 1884, and at present one of my assistants, in the course of his
clinical work as holder of the Stark Scholarship in Clinical Medicine).   The urine, if not albuminous,
must first have a little albumen added to it.   An albuminous urine does very well for this—care being
taken that one is selected which does not itself contain any excess of bile salts.   A few ounces of albu-
minous urine can be carbolized and kept just like other test solutions for any length of time.   If now
the urine be poured into a conical glass and a little cold nitric acid be run carefully down the side,
there will be, if bile salts are present in sufficient quantity, a precipitate of albumen at a certain level
in the urine, separated by a clear area from the precipitate of albumen produced by the nitric acid.
This upper precipitate of albumen is produced by the bile salts at the level at which the urine has become
acidified to the proper degree.   A slight reaction may occur even with the small quantity of bile salts
present in normal urine and a similar faint precipitate may also be seen in healthy urine owing to the
precipitate of mucin by the nitric acid.   A little practice will, however, soon enable you to distinguish
the slight precipitate which may occur in health from the well-marked and dense precipitate which
appears when the bile salts are present in excess.   It is, of course, necessary to avoid mistaking a pre-
cipitation of urates by the nitric acid for this reaction ; should there be any doubt, the effect of heat
will set it at rest.   As the test is simple and easily done and requires no special reagent, it is well fitted for
ordinary clinical work.

liarities might exist, permitting the transudation of albumen along with the water of the blood serum. But I am not aware of any sufficient evidence in favor of such a view, and the conditions under which the albumen appears seem susceptible of a better explanation. There are some considerations which favor the supposition that chemical changes in the serum may be the cause—namely, the occurrence of other morbid states of urine, such as glycosuria, phosphaturia, or oxaluria. Manifestly no change in blood pressure within the kidney or in the walls of the vessels, and probably no changes in renal epithelium could account for these, and it seems necessary to conclude either that the albuminuria and they are common manifestations of a faulty metabolism, or that, independently of alteration in the kidney inducing the one, we have alterations in the liver or other organs setting up the others. The other possible cause of the albuminuria, namely, vascular changes, seems to correspond most readily with the facts observed. The marked influence of muscular exercise and exercise of particular kinds and in particular postures does not seem readily explicable on the chemical hypothesis, while what we know of the physiology of the bloodvessels prepares us to believe that alterations of their lumena and of the blood pressure within them might readily be induced under such circumstances and result in the symptom in question. The occasional occurrence of glycosuria and the excess of bile salts might be advanced as difficulties in the way of this explanation, but it is easy to conceive that a general change in vascular activity which in the kidney induces albuminuria, might, in the liver, induce the other abnormalities. My judgment, therefore, leans toward this hypothesis, but I cannot give positive proof of its correctness.

As to the treatment of this class of cases, rest, judicious diet, and attention to the general health meet the principal indications; but I am anxious to give a careful and extended trial to such remedies as ergot and belladonna, which act upon the muscular fibres of the vessels, and shall not fail to do so as opportunity offers.

IV. I now proceed to consider much more briefly the fourth category of cases—those of *Simple Persistent Albuminuria*. I cannot speak so positively and definitely in regard to them, for on the one hand they are certainly rare, and on the other they are difficult to differentiate from examples of slight chronic organic renal disease; still our conception of this subject would be incomplete if we did not refer to them.

I can recall the case of a student whom I watched all through his University career. He looked quite healthy. No casts were ever found in his urine and the albuminuria was only accidentally discovered. He never had any bad symptom. He successfully went through the arduous work of a four years' course in medicine, which may be taken as a sufficient guarantee that, despite the albuminuria, his health was not

in any way seriously impaired. I cannot be certain that he had no intermissions, but I do not think he had.

I have at present under my care a gentleman, whose case probably is referable to this category. He has persistent slight albuminuria, none of the many specimens passed at all hours having ever been found free from albumen. But he has no tube casts and he discharges a normal quantity of urea. The albumen is scarcely influenced by diet or exercise, although, as is so often seen in all albuminurias, it is least abundant during the night and early morning. There is no distinct increase of vascular tension and no cardiac hypertrophy or other consequent complication of renal change. The only competing diagnosis is slight irritation of the urinary tract, due to an old gonorrhœa from which he formerly suffered. But as there is no positive evidence of this, I incline to think that a simple persistent albuminuria is the most likely cause.

The features of this kind of case I take to be persistent presence of albumen, usually in small quantity, unattended by tube casts, diminution of urea, by increased vascular tension, cardiac hypertrophy or other consequence of renal malady, persisting for a period of months or years and little influenced by diet or exercise. I cannot say whether further experience will confirm this view or not.

The last question which occurs in regard to these cases is as to prognosis. Are these different forms likely to continue simple, or do they culminate in organic renal disease? I think that in the first category there is a slight tendency to this latter issue. In the second and third categories it is less likely. From what has been said by such eminent authorities as Dr. George Johnson,[1] and Dr. Clement Dukes,[2] we cannot but fear that the condition does sometimes culminate in organic disease, but so considerable a proportion of my cases have gone on for long periods without doing so, that I am confident that it must be rare.

Dr. George Johnson has seen several cases in which, beginning with the simple affection, Bright's disease has developed. He mentions the case of a distinguished London physician, in whom at first albumen only appeared occasionally after walking exercise, and then was present in large amount, while diet had no apparent influence. After a time the albuminuria became persistent, and in the end fatal uræmia resulted. It is, of course, possible, that this was an example of cirrhotic Bright from the first, but when a contrary opinion is held by Dr. Johnson who saw the case, we are bound to conclude that the evidence was strong. Dr. Clement Dukes concludes that many cases are without doubt only transient, that probably many persist for years and yet recover, but he

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[1] Dr. George Johnson, British Medical Journal, December 13, 1879, pp. 928–930.
[2] Dr. Clement Dukes, British Medical Journal, November 30, 1878, p. 794, and Idem, 1881, vol. 2, p. 776.

believes that a large proportion are simply the first stage of Bright's disease.

It must not be forgotten that I have found in some cases of cirrhotic Bright's disease the urine generally free from albumen, that abnormality occurring only when the patient has taken alcohol to excess, has been chilled, or over-fatigued with travelling. But in such cases vascular and cardiac changes, and very probably alterations in the retina will be found, which give conclusive proof of the existence of cirrhosis. Neither must it be forgotten that cases of cirrhosis may show no albumen in specimens passed during the night or in the early morning, while in the day and evening urines it is distinct enough.

The distinguishing features upon which I would insist are the quantity of urea, the presence or absence of tube casts, and the condition of the pulse and heart. These will indicate whether simple albuminuria or organic disease is present, and if these indications are favorable I should give a hopeful prognosis.

The fourth category is one in which my prognosis would be less hopeful. Still, so long as the solids are in the normal quantity, and the vascular changes do not manifest themselves, we may speak hopefully even in such cases.

AN EXPERIMENTAL STUDY OF
MYCOTIC- OR MALIGNANT ULCERATIVE ENDOCARDITIS,

FROM THE LABORATORY OF
THE ALUMNI ASSOCIATION OF THE COLLEGE OF PHYSICIANS AND SURGEONS,
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It is convenient to group the inflammatory lesions of the endocardium into two classes—first, those in which the more prominent and constant character is the new formation of connective tissue, either in or upon the valves and general endocardium. This form of lesion may be designated by the name of *simple endocarditis*. Several varieties of this lesion may be recognized on the basis of their morphological characters. Thus the valves or the general endocardium may be simply thickened or sclerosed by a new formation of connective tissue, in a manner analogous to the interstitial production of new connective tissue so frequently seen in various internal organs. Or, either with or without a simple sclerosis, there may be irregular thickenings of, or distinct outgrowths from, the

endocardium—most frequently on the valves—in the form of polypoid projections, irregular warty excrescences, etc.

The tissue composing these outgrowths may be dense and firm like cicatricial tissue, or more soft and cellular like granulations, or some of the various forms of young connective tissue. Between these two extremes there may be all intermediate forms, which doubtless represent different phases in the development of the new tissue.

These new growths are liable to ulcerate, to become calcified, to become covered with loosely or closely adherent thrombi, from which emboli—always simple and non-infectious—may be swept off into the bloodvessels, producing infarctions and other disturbances of the peripheral circulation. A local inflammatory reaction may express itself in the accumulation of leucocytes in and about the bases of these outgrowths or so-called vegetations.

In another, an acute variety of simple endocarditis, there may be no new formation of tissue, but the valves and endocardium may be simply swollen and succulent and covered with larger or smaller thrombi; or they may ulcerate and the surfaces of the ulcers may be covered with thrombi.

In contrast to these, for the most part primarily proliferative lesions, stands the second form of endocarditis, namely, the *malignant ulcerative* or *mycotic endocarditis*, in which the dominating morphological and biological factor is the presence of bacteria of one form or another, and the necrotic or ulcerative change which their presence induces. Add to these features the variable inflammatory reaction of the surrounding tissue—which is expressed by the more or less marked accumulation of leucocytes near the seat of necrosis, and the infectious nature of the emboli which are liable to form, and the main characters of the type of endocarditis which form the subject of the present paper, are sufficiently outlined.

The writer means by malignant ulcerative endocarditis a form of lesion always associated with some kind of bacteria. The causative relation of these bacteria to the lesions, and, consequently, the justification of the classification and nomenclature, are points upon which it is hoped that the results of the present investigation may throw some light. However much some of the varieties of simple endocarditis may resemble the mycotic, both clinically and in the gross appearance of the lesions—and the similarity is in some cases exceedingly and puzzlingly close—in view of our present knowledge they seem to be etiologically, and to a certain extent morphologically, entirely distinct. The similarity in the gross appearance is usually due to the more or less voluminous thrombi which may form over the surface of the lesions in both alike. There are cases presenting an acute clinical history in which we find upon the heart valves larger and smaller, more or less abundant vegeta-

tions, sometimes composed in part of new-formed or forming connective tissue and sometimes entirely of thrombi, now without ulceration, and again with a very extensive necrotic process involving large loss of substance and with or without embolism. These may be appropriately called cases of acute endocarditis, or acute ulcerative endocarditis when the necrotic tendencies prevail, but neither the primary nor the secondary lesions contain bacteria, nor, as a rule, does the more or less pronounced stamp of an acute infectious disease prevail, as it is apt to do in cases of malignant ulcerative endocarditis. But one of these forms of endocarditis may be superimposed upon the other, when both clinical and gross morphological features may be very difficult to interpret correctly. It is more especially some of the forms of simple chronic endocarditis upon which the malignant type may be superimposed, and thus may indeed, as it would seem, form one of the predisposing or determining conditions without which the bacterial lesion would not be developed. This point will be considered more in detail further on. Finally, the possibility should be recognized that a proliferative change may occur secondary to the mycotic lesion, and thus bring about a certain degree of recovery.

The steps by which our knowledge of malignant endocarditis has grown are those common to most of the better understood acute infectious diseases. At first it was set aside from other apparently similar or related disorders by a set of clinical characters which were grouped under the general terms, malignant, septic, typhoid. The striking appearance of the heart valves, which presented soft and apparently rapidly formed and often very voluminous vegetations, with a tendency to local necrotic and multiple distant lesions—soon came to be regarded as characteristic of this form of disease. The growth of knowledge concerning embolism and thrombosis and their effects, to which the observations of Virchow so materially contributed, did much to explain both symptoms and lesions.

Very early in this, which may be called the morphological period in the history of this disease, certain very minute granules or corpuscles— masses of which were often seen to be surrounded by a homogeneous area—were detected in the cardiac as well as in the peripheral lesions.[1] These granules were sometimes simply described without speculation as to their nature, sometimes were pronounced, either conjecturally or positively, to be parasitic organisms. But neither the general knowledge upon the subject of microörganisms nor the technical facilities for their study were sufficiently advanced to give these earlier observations much more than an historical interest and importance.

Once turned in this direction, however, the tide of observation swept in numerous data, bearing more or less closely upon the relations of bacteria to this disease. In 1872 Hjalmar Heiberg[3] found microörgan-

isms in a case of ulcerative endocarditis in puerperal fever, and his observations were confirmed by Virchow. Eberth[4] found them in a case of pyæmic endocarditis in the same year, while Virchow wrote at length upon them in an article on chlorosis and endocarditis puerperalis.[5]

In 1873 Eberth,[6] Wedel,[7] and Larzen[8] recorded new observations, and in 1874 cases were added by Eisenlohr,[9] Burkhart,[10] and Maier.[11] Certain granular bodies, which they were reserved in claiming positively to be microörganisms, were recorded by Lehman and van Deventer[12] in 1875. In the following year Gerber and Birch-Hirschfeld[13] described another case, drawing the analogy with a case of simple pyæmia, in which the general lesions were similar, but the heart lesion was absent.

The impetus of a dominant theory or a very peculiar concourse of cases led Klebs[14] to the belief that all varieties of acute vegetative endo-carditis were of mycotic nature, and, furthermore, that for the rheumatic variety there was one form, and for the septic another form of bacteria. Koster[15] also regarded all acute endocarditis as of bacterial origin, and was led from his observations to the belief that it was due to emboli of the vessels of the valves and endocardium. Litten[16] was, also, of the opinion that all forms of acute endocarditis are of parasitic nature, and reports a number of cases.

At this time Hiller,[37] becoming alarmed at the rapidly accumulating data in favor of the bacterial origin of this disease, felt impelled to throw himself into the breach, and it is not a little curious to observe how many of the arguments which he used in his polemic against the proba-bility of its bacterial origin are just those which most readily fall into line as confirmatory of the results of research at the present time. But steadily with the improvement of the technique of staining the bacteria and the increasing knowledge of their biological characters grew the record of new observations. From 1878–1879 new cases were recorded by Eichhorst,[17] Cayley,[18] Purser,[19] Mygind,[25] and Hamburg.[21] The latter observer examined fourteen cases of acute endocarditis, and found cocci in but four of them. These four cases were all ulcerative, and three were in puerperal fever and one in pyæmia. He found no bacteria in several other ulcerative cases.

At this time Winge[2] formulated, for the first time, a consistent theory of this disease, based largely upon a carefully observed case, assuming the transportation of microbes from external wounds through the veins to the heart, where, he conjectured, they produced the lesions by lodge-ment upon the valves. Overbeck,[22] in 1881, reports the examination of five cases of ulcerative endocarditis, in all of which were numerous hemorrhages in various organs. In four of these cases micrococci were present, in one they were absent. In the first four cases there were numerous abscesses of the internal organs. In all of these cases there

were old endocarditic lesions.　Bramwell,[27] in eleven cases of ulcerative endocarditis examined, found micrococci in all.

The writer has for some time been examining the cases of endocarditis which came into his hands—particularly those with an acute history—for the presence of bacteria.　The method of staining at first employed was the simple fuchsin staining and decolorization with alcohol.　Since its announcement, Gram's method has been used in all cases, and controlled by the simple fuchsin method, as before.　The whole number of cases examined was twenty.　Of these, seven were of simple chronic verrucous endocarditis; thirteen were cases of ulcerative endocarditis, with a history of acute illness.

Chronic vegetative endocarditis, seven cases.　In none of these were bacteria found, either by staining or by culture methods.

Acute ulcerative endocarditis, thirteen cases.　In four of these cases the ulcerations, though well marked, were not extensive, and the thrombosis was insignificant in amount.　In the remaining nine cases there were extensive ulceration and local thrombosis.　In five of these thirteen cases sphæro-bacteria were present in large numbers.　In the remaining eight cases they were entirely absent.　In four of these thirteen cases cultures were made, one (recorded below) with positive, the others with a negative result.　The cases in which a negative result was obtained by the culture methods gave also negative results in the morphological examination.　The bacteria were, in all cases, of small spheroidal form, and were morphologically identical.　The ulceration and thrombus formations were quite as extensive in the series of cases in which the bacteria were absent as in those in which they were present.

1. *Cases in which bacteria were absent.*　In seven of these eight cases there was old thickening of the valves of the left side of the heart. The ulcerations were on the mitral alone in four cases, and on the aortic cusps in four.　There was simple infarction of the spleen in two cases, enlargement and softening of the spleen in three.　In three cases there was a well-defined previous history of acute articular rheumatism; in five there was no previous history at all.　In one case there was purulent meningitis with acute general bronchitis, and in one acute lobar pneumonia.

2. *Cases in which bacteria were present.*　In four of these five cases there was old thickening of the valves and endocardium.　The mitral alone was affected in two cases; the aortic alone in one; the tricuspid in one; and both mitral and tricuspid in one.　The spleen was large and soft in all of the five cases, and there were fresh and old infarctions in four.　In two cases there was no previous history, but there was old thickening of the aortic and mitral valves; in one case there was acute articular rheumatism; in two cases pyæmia.　In one of the two pyæmic cases—which both resulted from injury—there was malignant osteomye-

litis and periostitis, purulent pericarditis, and thrombosis of the pulmo-
nary artery; while in the other there were multiple abscesses in the
brain and kidney, infarctions of liver and spleen, and abscess of the
myocardium.

It does not enter into the scope of the present paper to detail the
clinical history of these cases, but it may be remarked that the two
classes of cases—i. e., those with and those without bacteria—ran courses
nearly equal in acuteness and rapidity, and presented symptoms equally
obscure.

While in the great majority of cases the bacteria found in the lesions
of malignant ulcerative endocarditis are all of the small spheroidal
form, a few cases are recorded in which bacilli were present. Such a
case is mentioned by Osler,[23] one is reported by Smith and Northrup,[24]
and one by Netter, and Martha.[25] Cornil[26] mentions the occurrence of
bacillus tuberculosis in the vegetations in a case of phthisis, as do also
Rindfleisch and Kundrat. All of these scattered observations rest,
however, upon a purely morphological basis, and bearing in mind how
readily the bacilli of decomposition may make their appearance in this
situation, if the examination be delayed or the manipulations faulty,
our estimate of the significance of the presence of bacilli in a very few
cases should be held in abeyance until more detailed and careful observa-
tions are at hand.

We now enter upon a new phase in the story of investigations upon
this disease. Hitherto the studies recorded have been simply morpho-
logical, and the conclusions regarding the significance of the presence
of bacteria have been largely conjectural. The very large number of
observations coincident in result have made it certain that sphæro-bacteria
are very constant factors in certain, but not in all cases of ulcerative
endocarditis; but whether they are of etiological importance or only
insignificant concomitants, does not yet appear.

In a rather crude way attempts have, indeed, for some time been made
to supplement our knowledge of the morphology of these lesions by ex-
periments bearing upon the pathogenic characters of the bacteria so
frequently present.

As early as 1870, Winge[2] made subcutaneous inoculations of animals
with particles of the vegetations, but without definite results. In 1872,
Heiberg[3] made peritoneal and intravenous inoculations, also without
positive results. Panophthalmitis and keratitis have been produced in
the rabbit by direct inoculation by Eberth,[6] Birch-Hirschfeld,[13] and
Osler.[23] Grancher[28] made some cultures of bacteria from a case of
ulcerative endocarditis after rheumatism, but their characters were not
sufficiently carefully studied for indentification, and they died before
inoculations were practised. Perret and Rodet[29] report without suffi-
cient detail some inoculations of dogs with vegetations from a case of

acute endocarditis rubbed up with filtered water, and state that vege-
tations were found upon the valves. They also state that they used fluid
cultures with equal success. The account, however, is so lacking in de-
tail and the experiments in precision that one can hardly attach much
importance to them, especially as dogs are liable to spontaneous acute
endocarditis. But these experiments are all crude and belong to an
earlier epoch of research.

The necessity of obtaining pure cultures of bacteria of suspected
pathogenic nature and the study of their biological as well as their
morphological characters and their effects upon animals, are now recog-
nized as imperative for the solution of such problems as that which
now engages us. The use of solid culture media, and particularly the
use of gelatine or other form of plate cultures as elaborated by Koch,
has placed in our hands the means of isolating such of the bacteria
of disease at least as are " facultative " saprophytes and capable of de-
veloping and growing in the culture media at present known to us.

A series of cultivation and inoculation experiments made by Hare,[27]
and recorded in a recent number of this journal, gave negative results.
Unfortunately, the bacteria, which were cultivated from the kidney
abscesses of one of Bramwell's cases, in gelatine bouillon tubes and on
potato appear to have become contaminated and were neither identified
nor fully described. It does not appear from the text that the gelatine
plate method of Koch was resorted to for separating and identifying the
bacteria presumably derived from the heart lesion, and without this
such a series of experiments could hardly be expected to yield perma-
nently valuable results.

Impressed with the importance of the biological method of research,
Wyssokowitsch,[30] under Orth's direction, recently instituted a series of
experiments which led to unexpected and positive results. He started
with the fact recorded by Ottomar Rosenbach[31] in 1878, namely, that a
traumatic injury to the heart valve of the rabbit by means of a sound
introduced through the carotid is not followed by an inflammatory reac-
tion, and by no or but a very slight thrombosis.* Then choosing, somewhat
at random, the well-known pathogenic organisms, the significant relations
of which to pyæmia and the suppuration process have been so thoroughly
studied, namely, Streptococcus pyogenes, he introduced pure cultures of

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* These results of Rosenbach's experiments, showing the comparative tolerance of the endocardium
toward mechanical interference, recall a notion, formerly widely entertained, that the endocardium
was an exceedingly sensitive structure ; and in the early days of the accumulation of knowledge con-
cerning pyæmia it was held by some that the chills were produced by the irritating effect upon the
endocardium of the entrance of pus into the heart.

Bichat recommended in cases of asphyxia to stir up the heart by passing a sound down a vein of the
neck and tickling the endocardium. This was actually done by Dieffenbach in cases of Asiatic cholera
with collapse, but without effect. Virchow found, however, by introducing into the heart glass
sounds, pieces of ice, meat, etc., that the endocardium was quite insensitive. Virchow, Gesammte
Abhandlungen, p. 229.

these into the vein of the ear of the rabbit, soon after having produced the injury to the heart valves as above described. The seven rabbits operated upon died in from one to eleven days—at the latter period when a very small quantity of the inoculating material was used. In five of these animals numerous larger and smaller vegetations were found near and in some cases somewhat distant from the seat of injury, both where the valve was perforated and where the sound had evidently touched the endocardium. These vegetations consisted of large numbers of sphæro-bacteria similar to those injected, a little fibrin, and red blood-cells. Beneath these was a distinct necrotic area, which grew larger as the bacteria made their way into the tissue from the surface. In some cases there were pericarditis and cardiac abscesses. Metastases in the kidneys, spleen, and knee-joint were noted. Suppuration around the bacterial masses was not observed. In one case in which the injection of the bacteria was delayed for forty-eight hours, no such changes in the endocardium were observed. In the other case the operation was unsuccessful, and the experiment vitiated by the chance introduction of some contaminating bacteria of another species.

After these striking results, Wyssokowitsch repeated the experiments, using for inoculation cultures of the bacteria so frequently associated with the streptococcus in pyæmia and the suppurative process, namely, Staphylococcus pyogenes aureus. Three rabbits were inoculated after the preliminary operation: two with a concentrated and one with a much diluted emulsion of the bacteria. The first two died on the first and second days and presented lesions in general similar to those induced by the streptococcus, except that the bacteria were not so abundant and not in such large masses in the lesions, and the suppurative process near their seat of deposit was well marked. The third rabbit died thirty-eight days after the operation, and presented no lesions, except the original puncture of the valve. Following this one rabbit was operated on in the same way, and immediately inoculated with the coccus sepsis of Nicolaier. It died on the fourth day, and the results were essentially the same as with the streptococcus. A local infection of one side of the left auricle, which was in contact across the cavity of the auricle, with a vegetation evidently the result of the extension of the process from the injured valve through the heart wall, gave an excellent example of the extension of the process *per continuatatem* as well as *per contactum*.

The original results of Rosenbach were confirmed by operations on four rabbits. Two rabbits were inoculated after the operation on the valves with micrococcus tetragenous and two with the bacillus pneumoniæ of Friedländer, but with entirely negative results.

Finally, Wyssokowitsch succeeded in obtaining pure cultures of bacteria from a fresh case of malignant ulcerative endocarditis in man with metastatic lesions. Those obtained by the usual plate culture method

presented all the characters of Staphylococcus pyogenes aureus.   Cultures from this case gave, by a repetition of the above operation, results identical with those obtained in the use of the same species from another source.

Shortly after the announcement of these results by Wyssokowitsch, Weichselbaum[32] published the results of his examinations of three cases of malignant ulcerative endocarditis, and one case of acute vegetative endocarditis.   The three cases of ulcerative disease were young females, two with rheumatism and one with a history of old valvular lesions.   In one of these cases he found and cultivated for identification from the pericardial fluid, the cardiac vegetations, spleen and urine, a mixture of Staphylococcus pyogenes aureus and albus, and Streptococcus pyogenes. In another case he cultivated from the vegetations Streptococcus pyogenes, while in the third case he identified only the Staphylococcus pyogenes aureus.   In the case of acute vegetative endocarditis, which was that of a young rheumatic female, he identified Streptococcus pyogenes only.   His experiments on animals, of which the details are not yet published, gave, he states, results essentially identical with those of Wyssokowitsch.

While the work of Wyssokowitsch and Weichselbaum was going on, and especially after their results were announced, Ribbert[33] was studying the subject with a somewhat different technique.   He omitted the preliminary direct mechanical injury to the endocardium, and introduced potato cultures of Staphylococcus pyogenes aureus directly into the veins of rabbits.   At first he scraped off the superficial growth of the culture with a little of the potato, and ground them fine before the injection; his results in this way were inconstant.   When, however, he injected with the bacteria larger particles of the potato among and into which they had grown—particles as large as would pass the canula of the injecting syringe—and used quite large quantities, he was able to produce not only cardiac abscesses and areas of necrosis in the myocardium, but most marked vegetations upon the endocardium, especially on the mitral and tricuspid valves.   The vegetations were most apt to be at the points of attachment of the chordæ tendineæ to the valves, and on the outer surface of the valves; they were never found on the aortic and pulmonary valves.

Microscopical examination showed the various stages in the development of the endocardial lesion.   At first there was a simple lodgement of the bacteria upon the surface of the endocardium—in a few cases a particle of potato was found on the surface with the bacteria clustered around it.   The bacteria gradually penetrated the underlying tissue, causing a local necrosis over which the thrombus formed.   For the details of the microscopical study we must refer to the original.   In a word, Ribbert obtained essentially the same results as Wyssokowitsch

and Weichselbaum by introducing with the bacteria a foreign substance, which apparently either produced the necessary mechanical injury or brought about the adherence of the bacteria to the endocardial surfaces. By his method of experimentation, however, it is necessary to use larger quantities of the inoculating material, a proceeding which is always undesirable when conclusions, bearing upon similar lesions in man, are to be drawn from the results.

Ziegler[34] identified the sphæro-bacteria in one case of malignant ulcerative endocarditis as Staphylococcus pyogenes aureus.

Striking and momentous as are the results of the just recounted experiments, it is obviously of the highest importance that they should be repeated under varying conditions, and that the sphæro-bacteria now so frequently found in ulcerative endocarditis in man by the improved methods of staining, should be more precisely identified and in every suitable case studied by the methods which the solid culture media of Koch have placed in our hands.

The primary purpose of the writer in the experiments now to be recorded, was to repeat independently and from the beginning the experiments of Wyssokowitsch in so far as they could be done with the fully identified bacteria derived from a case of human malignant ulcerative endocarditis.

All of the bacteria used in these studies were derived from a case for the organs and history of which the writer is indebted to the courtesy of Dr. George M. Swift, of New York.

Mary C., aged fourteen years. Had convulsions at eighteen months, scarlatina early in life but no rheumatism, and was apparently well and strong. She was admitted to hospital February 22, 1886, for operation on clubfoot. Cuneiform osteotomy was performed "antiseptically" on February 26, and for the first few days patient did well but complained of pain in the foot. On March 6, there was an erysipelatous redness about the wound and the temperature rose, but was reduced by antipyrin. She became delirious at times and unconscious; had twitching of muscles on left side, and died on March 10.

Autopsy. *Brain:* Meninges apparently normal, ventricles not dilated. Numerous small sub-pial hemorrhages, mostly quite superficial, on cerebral convolutions. A few hemorrhages were at the bottom of the sulci, and some of these involved small areas of the gray matter, which about them was soft and red. *Heart:* Pericardium normal. Aortic and pulmonary valves normal. Scattered along the edges of the tricuspid and mitral valves and nearly completely investing them, were irregular rows of larger and smaller, white and red, firm and closely adherent excrescences, some of them covered with loosely hanging red and white thrombi. On one of the papillary muscles of the left ventricle was a small eroded area loosely covered with a thin red fibrinous pellicle. In the left ventricle were also numerous small subendothelial petechiæ and one small abscess. *Lungs* normal. *Spleen* soft and large, and presented an irregular grayish friable area about one centimetre in

diameter. *Kidneys* moderately large, capsule free, studded with numerous small yellowish-white spots surrounded by zones of diffuse redness. On section, the cortices were thickened, light in color, markings obscure. Everywhere, both in cortex and medulla, the cut surface was thickly besprinkled with small yellowish-white spots and streaks. The spots were from one to three millimetres in diameter and many of them were surrounded by a sharp red zone. There were also numerous sharply circumscribed red spots. *Liver* presented several larger and smaller white irregular areas, some of them very soft, having the appearance of infarctions. Other organs appeared normal.

Microscopical examination. The tricuspid and mitral valves are irregularly thickened, the new tissue being mostly dense and firm, and consisting largely of basement substance. In the superficial portion, however, the cells are more abundant and fusiform, stellate, and spheroidal. The surfaces of these—for the most part apparently old vegetations—are irregularly bestrewn with larger and smaller masses of very small spheroidal bacteria arranged in pairs or in large or small irregular clusters, or lying singly. They stain readily by Gram's or by the simple fuchsin method. These bacterial masses are in part covered—in part intermingled with granular matter, a few leucocytes, fibrin, and a few red blood-cells. Beneath the mass of bacteria there is in most cases a larger or smaller area of necrosis of the vegetation in which the nuclei remain unstained, and the basement substance presents a translucent, finely granular, or structureless appearance. In many places there is an irregular zone around the areas of dead tissue in which there is a greater or less accumulation of leucocytes. In general, the necrotic process in this case is not advanced, involving only little spots here and there on the surface of the vegetations where the tiny masses of bacteria have found lodgement.

The lesions of the other internal organs were those common to pyæmic abscesses and infarctions.

The kidney presented microscopically a variety of phases in its lesions corresponding to the varied gross appearance. In some places the larger, but particularly the smaller bloodvessels were plugged by masses of bacteria with little or no reaction of the tissue about them. In other places the bacterial masses were surrounded by a zone of dilated bloodvessels. Again, there was localized necrosis around the bacterial plug, while around this necrotic area there was sometimes simply a zone of enlarged bloodvessels, or an accumulation of leucocytes, or both. In some cases the bacterial mass was closely surrounded by an accumulation of leucocytes, so dense that the kidney tissue for some distance around was entirely concealed, or completely broken down. The liver and spleen presented the usual effects of infectious emboli. The brain showed microscopically a plugging of the smaller bloodvessels in the hemorrhagic areas with bacteria, while around these plugs were either a simple zone of dilated bloodvessels, or extravasation, or a localized breaking down of brain tissue; or, in a few cases, an extravasation of blood surrounded by a zone of purulent infiltration. Finally, in some places, the brain tissue surrounding the bacterial embolus appeared to be simply necrotic, without hemorrhage, and without inflammatory reaction.

Some portions of the kidney were placed in a covered sterilized jar, and allowed to stand at the temperature of the room for twenty-four to

sixty-six hours. Stained sections made at various intervals from carefully removed fragments of these pieces showed, in the most evident manner, a large and steady increase in the number of bacteria. The bacteria, furthermore, were no longer, as in the freshly hardened tissue, mostly confined to the bloodvessels and the abscess, but were in the lumina of the tubules and outside of the vessels in the cavities of the glomeruli. This increase in the number of pathogenic bacteria in the tissues after death,[35] which is now a well-established fact, is too often overlooked, and should always be taken into consideration, not only in estimating the number of bacteria present in any given case, but also in determining the positions which they occupy.

The organs were received in a very fresh condition, and with a most strict adherence to the usual antiseptic precautions, several peptonized gelatine plate cultures were prepared in varying degrees of dilution from the vegetations of the valves and from several of the renal abscesses. At the ordinary temperature of the laboratory at the end of the second day numerous colonies were just visible to the naked eye. Under a low magnifying power these colonies presented sharp edges, were moderately finely granular, of a slightly brownish color, and had just begun to liquefy the gelatine around them. No other forms of colonies appeared in the plate, except an occasional aërial surface contamination. From these plate colonies, gelatine, agar, and blood-serum tubes and potatoes were inoculated. In gelatine tubes the culture medium became gradually fluid with a whitish pellicle on the surface, which gradually assumed a light yellow color, and soon sank to the bottom. The liquefaction progressed until the entire mass was fluid, and as this went on the gelatine itself became darker in color, and the bacterial sediment of a deeper yellow. On agar the growth in the thermostat at 37° C. was rapid, spreading usually from the line of inoculation for from one to three millimetres over the surface, and growing less vigorously along the puncture line. The surface growth, at first white, gradually assumed a more or less bright yellow color, particularly in the older parts. Along the puncture line the growth remained white. The agar was not liquefied, and the yellow color became more intense as the culture grew older, finally deepening to a rich orange. On blood-serum a yellow pellicle formed without fluidification. On potato the growth was slow at chamber-temperature, gradually assuming a light or deep yellow color. The gelatine and agar cultures were transplanted through many generations, their characters remaining unchanged.

Six rabbits were inoculated subcutaneously with about two cubic millimetres of an agar culture. Five of these developed abscesses which contained the same bacteria. The sixth rabbit presented no reaction. Injection of about the same quantity of the culture mixed with sterilized three-quarter per cent. salt solution into the pleural and abdominal cavities of three rabbits, were followed by a rise of temperature of from one to three degrees on the two following days and after this there was complete recovery.

It will be seen from this *résumé* of the characters of the bacteria cultivated from the heart vegetations, and from the renal abscesses in a case of malignant ulcerative endocarditis in man, that they were the Staphylococcus pyogenes aureus, which is so frequently associated with pyæmia

and the suppurative process.[36]   This, it will be remembered, is the same species which Wyssokowitsch found in his one case, Weichselbaum in two of his four cases, and Ziegler in one case of this disease.

An unlooked-for confirmation of the pathogenic properties of these bacteria occurred in the person of one of the writer's associates in the laboratory.   He was inoculated in the finger from handling the abdominal viscera of one of the rabbits dead on the second day after an intravenous injection of a pure culture.   He suffered for several days from a severe phlegmon of the finger, with great tenderness of the lymphatic glands of the entire body.   On opening the abscess of the finger which rapidly developed, about one drachm of pus was discharged, from which with the greatest ease the same Staphylococcus pyogenes aureus was cultivated.

ANIMAL EXPERIMENTS. — These were performed exclusively on rabbits.

Punctures of the valve without subsequent inoculation.   At first five rabbits were operated on by Rosenbach's method, for the sake of control, as follows :

The animal being narcotized or anæsthetized was stretched on the Czermak table with the neck raised by a block of wood so as to straighten the carotid as much as possible.   The hair was removed over the right carotid region and the skin thereabouts carefully cleansed with sublimate solution 1 : 1000.   The carotid was now exposed for an inch of its course, and two ligatures passed around it about three-quarters of an inch apart. The distal ligature was drawn tight and tied, while the proximal was left loose.   A V-shaped opening being now made with scissors in the carotid, a small silver probe, carefully sterilized by heat, was passed into the vessel and by a little manipulation carried downward.   When the semilunar valves were reached a slight resistance was observed.   This was readily overcome by a moderate pressure on the probe which readily punctured one of the cusps.   At this moment the heart usually bounded and its beats became irregular and very rapid.   On the withdrawal of the probe the proximal ligature was tied, the wound washed thoroughly with sublimate solution, closed by sutures, and bandaged with absorbent cotton and flannel.   A blowing sound could in most cases be distinctly heard after the valve puncture, and the heart beats remain for a few hours frequent but regular.

Very little blood was lost in these operations and the animal rapidly recovered spirits and appetite.   The wound healed in all cases by first intention, when the animals were allowed to live long enough, and on killing them at periods of from twenty hours to thirty-six days, no marked reaction was found at the seat of puncture of the valves or in the internal organs.   The edge of the somewhat ragged opening in the valve was in one case loosely covered by a filmy clot.   After a few days the edges of the puncture became smooth and slightly thickened, and so remained up to the latest period at which the animals were killed, namely, thirty-six days.

Conclusions. Simple puncture of a cusp of the aortic valve in rabbits with a sterilized probe introduced under antiseptic precautions through the carotids, is followed by no result other than a slight thickening of the edge of the puncture through the valve.

Punctures of the valve followed by inoculation. Following the method of Wyssokowitsch, eight large, healthy rabbits were operated on in the manner just described, and after from one to three hours a varying quantity of the cultures of the Staphylococcus pyogenes aureus from the above case of malignant ulcerative endocarditis was introduced by means of a sterilized Koch's balloon inoculating syringe into the vein of the ear. For this purpose not less than one cubic centimetre of a fluidified gelatine culture, or from one to two cubic millimetres of an agar culture was used, mixed with a small quantity of three-quarter per cent. salt solution.

One of these rabbits died in sixteen hours, and showed a broad scratch at the lower end of the carotid, and a simple puncture of one of the cusps of the aortic valve. There was congestion of the lungs, but no other lesion. In one other animal the temperature rose to $104\frac{3}{5}°$ on the second day, and the animal seemed dull and ill, but on the third day the animal appeared well, and continued so until the twenty-sixth day, when it was killed. There was a simple puncture of the valve with slightly thickened edges and numerous calcareous deposits in the kidney, but no other lesions.

The operation on the remaining six animals gave positive results, which were so nearly similar that they may be summarized as follows: The temperature rose from $103\frac{1}{2}°$ to $105°$ during the first few hours, and usually continued elevated until within a few hours of death, when it fell to normal or below. The animals, for the most part, refused food, appeared stupid, and disinclined to move, and toward the end grew very weak, and scarcely able to sit upright. A feeble convulsive movement of the entire body frequently immediately preceded the death, which occurred, on the average, in from forty to fifty-five hours.

In all cases the wound in the neck was dry and healing favorably. In four cases there was sero-fibrinous pericarditis, and the exudation contained numerous sphæro-bacteria, which morphologically and by culture were identified as Staphylococcus pyogenes aureus. In four of the six cases a cusp of the aortic valve was punctured, while in these and in the two others there was a line of roughening along the lower end of the carotid and on the endocardium below the valves in the line of passage of the probe. It will thus be seen that in two of the six positive cases the probe had slipped between the valves, injuring the endocardium below and the aorta above.

In all of the six cases, along the line of carotid erosion, around the seat of puncture, or on the surface of the injured valves, and on the

endocardium below, were larger and smaller, irregular elevated masses, resembling fresh cardiac vegetations.

On microscopical examination these vegetations were found to consist of masses of sphæro-bacteria, intermingled with fibrin, granular matter, and a few red and white blood-cells. The larger of these vegetations rested on a more or less evidently eroded endocardial surface.

The microscopical examination of the endocardium and inner surface of the carotid near the points of contact of the probe, and sometimes for some distance from it, revealed tiny elevations of similar character, but so small as to be scarcely, or not at all, visible to the naked eye. Among these smaller elevations could be traced all intermediate forms between the simple deposit of a tiny cluster of bacteria on the surface of the endocardium, and well-marked vegetations, in which the bacteria were intermingled with fibrin and granular material, and rested on a necrotic base. The localized necrosis of tissue in the immediate vicinity of the clusters of bacteria, both large and small, was a very marked feature in all of these experimental cases. In many cases, not only the fibrin around the bacterial masses, but the endothelium and subendothelial tissue, to a varying depth, were converted into a structureless or finely granular material, which did not stain.

In one case there was a moderate proliferation of the endothelium at the outer border of the necrotic area, and in many, especially when the life of the animal was prolonged, there was a zone of small spheroidal cells at a short distance from the necrotic region in the subendothelial tissue.

In one case the heart muscle was thickly beset with tiny abscesses, some of which projected beneath the endocardium. In two other cases, one and two small subendocardial abscesses were found. Microscopically these abscesses consisted of pus cells and fragments of necrotic muscle fibre which had lost their striation, while bacteria were found either within the abscess, or at a short distance from its border, and blood-vessels could be readily demonstrated the lumina of which were completely plugged with them. The very early period after inoculation— sometimes within thirty hours —at which these abscesses may be fully formed, is worthy of note.

The right auricle and ventricle in most of these cases were distended with voluminous loose red clots in which numerous bacteria had lodged. These were identified as the same species as those inoculated.

The lungs were, as a rule, normal, as was also the liver, but in one case the latter organ presented a large infarction involving the anterior border.

The spleen was uniformly enlarged, frequently to twice or thrice its normal size, and soft. It contained the same bacteria.

The kidneys were congested and in all but one of the six cases pre-

sented several large infarctions. In one case they were studded with larger and smaller abscesses.

The microscopical examination of the kidney revealed most exquisite forms of pyæmic abscesses and infarctions. Larger and smaller blood-vessels were plugged with masses of sphæro-bacteria, in some cases with no alteration of tissue around them. Or, directly surrounding the bac-terial mass there would be a larger or smaller area of necrosis; while these necrotic areas were in turn, in many cases, enclosed by a wide or narrow zone of purulent infiltration. The origin of the infarctions could in many cases be most readily demonstrated in the plugging of larger vessels by enormous masses of bacteria. Partial or nearly complete in-jection of the vascular tufts of the glomeruli with bacteria was of fre-quent occurrence.

In one case there was a gangrenous area of about one inch in diameter in the large intestine. The only brain lesion noticed was a moderate congestion in three cases.

In the above mentioned case of this series, in which the animal was at first ill, but afterward recovered, and was killed on the twenty-sixth day, the kidneys were thickly beset with larger or smaller calcareous masses, mostly elongated and more or less contorted. These encroached upon the kidney tissue in their vicinity, which was thickly infiltrated with small spheroidal and elongated cells, and were apparently the result of recovery from the original renal emboli.

In all of these cases gelatine plate cultures were made from the heart and kidney lesions, and the pure cultures thus obtained were used in continuing the inoculations from one animal to another. It was from one of the later cultures in the series that the above mentioned human inoculation occurred. Thus the bacteria, which so promptly produced the severe phlegmon of the finger, originating, so far as these experiments go, in the heart valves of a case of human malignant ulcerative endocar-ditis, had passed successively through three rabbits, producing death in each case, and through almost innumerable generations in the culture tubes and plates.

Conclusions. This series of experiments shows, in confirmation of the results obtained by Wyssokowitsch, that the introduction into the blood of rabbits of a considerable quantity of a pure culture of Staphylo-coccus pyogenes aureus, after a mechanical injury to the endocardium, is capable of producing, in addition to the peripheral changes character-istic of pyæmia, the typical lesions of malignant ulcerative endocarditis, and that the seat of these cardiac lesions is determined by the position and extent of the mechanical injury to the endocardium.

Chemical injury to the endocardium followed by inoculation. In order to ascertain the effects of chemical irritants in rendering the endocardium vulnerable to the action of the bacteria, I have varied the preliminary

operation by arming the point of the probe with a fused mixture of equal parts of silver and potassium nitrate, covering this with a thin coating of sugar and passing it down the right jugular vein. The point of the probe may be brought to any desired position, after a little practice, before the sugar dissolves, and thus the mitigated caustic may be rubbed against the endocardium, the parts above having been protected by the film of sugar. The point of the probe may be held against the wall of the right auricle, or carried between the leaflets of the tricuspid valve, or pushed down into the ventricle. A small, firmly adherent thrombus usually, but not always, forms at the points of contact of the silver salt with the endocardium and into this thrombus the bacteria make their way, or in its absence lodge on the endocardium and induce lesions similar to those above described as following a mechanical endocardial injury. Hemorrhages and abscesses of the lungs are more frequent after these operations on the right heart, but otherwise the peripheral lesions are the same as those above described. Seven rabbits were operated on in this way with identical results.

Conclusions. The action of chemical agents upon the endocardium in the rabbit produces a condition of predisposition to the lodgement and growth of Staphylococcus pyogenes aureus similar to that induced by a simple mechanical injury.

For the purpose of control, two rabbits were operated on by passing a sterilized probe down the jugular into the right heart, allowing it to remain there for a few seconds and then withdrawing it and closing the wound. After this, on introducing the usual dose of Staphylococcus pyogenes aureus culture into the blood through the ear vein the animals died with renal infarctions and swollen spleen, but there were no heart lesions.

Chemical injury to the endocardium not followed by inoculation. In three rabbits, the sterilized probe armed with silver nitrate was introduced into the heart through the jugular and its point rubbed against the tricuspid valves and endocardium until the silver salt was dissolved. It was then withdrawn and the wound closed. These animals remained apparently well and were killed, one in twenty minutes, one in five, and the other in six days. In the animal killed after five days there was a slight loose red and white clot adherent to the edges of the tricuspid valve. In the other animals there was no clot and no apparent change in the endocardium. Microscopical examination of the clot showed no bacteria.

Conclusions. These control jugular experiments show that a simple light contact of a sterilized probe with the endocardium of the right heart does not, in rabbits, produce a sufficient injury to that structure to determine a localization of Staphylococcus pyogenes aureus in the heart after a subsequent intravenous injection of them; furthermore,

that a simple chemical injury to the endocardium, such as is produced by the contact of silver nitrate, not followed by bacterial inoculation, does not, in rabbits, produce the lesions of endocarditis.

SUMMARY.—Bacteria are frequent in a certain proportion of cases of acute ulcerative endocarditis in the cardiac, and, when these exist, in the peripheral lesions. These bacteria are small and of spheroidal form in almost all of the cases thus far described; but in a few cases the presence of bacilli has been noted. There are cases of ulcerative endocarditis with extensive destruction of tissue and large formation of thrombi, in which the lesions are entirely free from bacteria. In these cases, as a rule, the endocardium is the seat of an old inflammatory process and the peripheral embolisms, infarctions, etc., do not contain bacteria.

In many cases of acute ulcerative endocarditis associated with bacteria the valves and endocardium are also the seat of old inflammation.

The destructive process and formation of thrombi in the heart valve and endocardium may be as marked and extensive in the cases in which the bacteria are absent as in those in which they are present; but in the latter class of cases the embolic lesions which are apt to be developed are of an infectious nature, and the general course of the disease is apt to bear the stamp of an acute infectious disorder.

These two classes of cases may be appropriately designated as *ulcerative* or *acute ulcerative endocarditis*, but those in which the bacteria are present should be distinguished by the term *malignant bacterial* or *mycotic ulcerative endocarditis*.

The gross appearance of the valvular lesion does not always or usually enable us to distinguish between these two forms of disease. Bacteria are sometimes present in cases of acute vegetative endocarditis, but in the lesions of chronic proliferative endocarditis they do not appear to occur at all.

The bacteria which are present in the cardiac and peripheral lesions in cases of malignant ulcerative endocarditis are the causative factors in the disease. This has been shown by three independent observers, who have isolated the same species of bacteria from cases of this disease in man; obtained them in quantity in pure cultures; induced in rabbits by their inoculation, under special conditions, lesions of the endocardium as nearly identical with those in man as the nature of animal experimentation will permit; and finally determined the presence of the same bacteria in the cardiac and peripheral lesions of the operated animals.

The bacteria apparently produce the cardiac lesions by lodgement on the surface of the valves and endocardium, when the latter are rendered vulnerable to their action either by mechanical or chemical injury; or by the presence of old inflammatory alterations; or by conditions unknown to us.

Bacterial embolism of bloodvessels of the heart valves is apparently not of frequent occurrence, as was formerly believed.

The only bacteria which have been thus far absolutely identified as occurring in the lesions of malignant ulcerative endocarditis in man are Streptococcus pyogenes and Staphylococcus pyogenes aureus. This identification has been made in six cases.

It has been demonstrated that other species of bacteria than those above mentioned are capable of causing similar lesions in rabbits under similar experimental conditions.

REMARKS.—The relations of malignant ulcerative endocarditis to the acute diseases such as pneumonia,* typhoid fever, etc., in connection with which it is apt to occur, still remain obscure, and in the light of the new methods are almost entirely unstudied. It is, however, noteworthy that in all the cases of this disease thus far fully studied by biological methods, the bacteria identified are those which play so important a *rôle* in pyæmia and the inflammatory processes in general. In these cases the disease may be regarded as one of the local lesions of pyæmia.

The great frequency with which the acute ulcerative disease is engrafted upon an old endocardial lesion would seem to indicate that in the human subject the absence of endothelium, or the roughness of the surface of the thickened endocardium, affords conditions of predisposition for the lodgement, and vulnerability toward the incursions of the bacteria, where once they gain access to the blood, similar to those produced experimentally in the rabbit by mechanical or chemical means.

To seek for the nature of the acquired vulnerability in a diminished vitality of the endothelial cells whereby they become unable to cope successfully with the ptomaine-producing bacteria which find lodgement upon or near them, would lead us in a direction toward which many experimental data point; but it is perhaps better, for the present, to remain on what seems to be fully established ground. The injection of Staphylococcus pyogenes aureus into the blood of the rabbit may cause death by pyæmia, but it does not induce malignant ulcerative endocarditis. Simple chemical or mechanical injury to the valves and endocardium does not induce endocarditis. Perform both operations at once and the disease almost invariably follows.

This predisposing factor in disease, which has long been recognized, has become more evident and demanded a more precise comprehension since the causative relationship of microörganisms to certain diseases has

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* Some recently recorded experiments by Netter on ulcerative endocarditis associated with acute lobar pneumonia (Archives de Physiologie normale et path., Aug. 15, 1886, p. 106) contain interesting and important data. But the meagreness of detail in the record of his experimental work, the uncertainty which still exists as to the significance of the various so-called pneumococci, and the far-reaching deductions which he makes from experimental procedures by no means free from grave technical errors, seem to render unnecessary at present a more extended consideration of his paper.

been established.   In the disease before us, the gross nature at least of
the predisposing factor is very simple and evident.   In other diseases—
tuberculosis or pneumonia, for example—the conditions are much more
subtle and difficult of definition but none the less important.

In the search after these predisposing conditions in diseases already
proven to be immediately due to the action of bacteria, such a vast
amount of labor remains to be performed, both in the clinical, physio-
logical, and morphological departments, that it becomes evident that the
whole field is by no means won, as is too often assumed, when a disease
is demonstrated to be of bacterial origin.

The immediate duty of observers of malignant ulcerative endocarditis
from the etiological standpoint is evidently to study every suitable case
completely by the biological as well as the morphological methods and
thus ascertain the exact characters of the bacteria involved.

Finally, in view of the significant relationship of the bacteria of
pyæmia and suppuration to malignant ulcerative endocarditis in the
cases thus far fully examined, it is evident that a demonstrably diseased
condition of the heart valves, or a previous history which would suggest
the possibility of such a condition, should be an additional incentive to
the practice of a vigilant antisepsis in operations, however simple, upon
this class of cases.

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ACTINOMYCOSIS HOMINIS.

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ACTINOMYCOSIS is defined by Ziegler as a progressive inflammatory affection, set up by a certain fungus—the actinomyces; resulting in the formation of granulations and fibrous tissue, and in suppuration; attacking human beings, cattle, and swine; and communicable to cattle by inoculation.[1]

The disease as occurring in cattle was first described by Bollinger, in

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[1] The most complete account of this disease hitherto given is that by Israël, in the Klinische Beiträge zur Kenntniss der Aktinomycose der Menschen, Berlin, 1885, an abstract of which, by Dr. Whiteside Hume, has been published in the New Sydenham Society's volume entitled Bacteria in Relation to Disease, edited by Mr. Watson Cheyne.

1877, as a condition in which sarcoma-like tumors were met with, associated with a peculiar growth which, from its structure, was named the ray-fungus, or actinomyces. In man this organism was observed and described by Israël in 1877, but it appears that Ponfick in 1879 was the first to recognize the true nature of the disease, and to establish its identity with the condition previously described by Bollinger as met with in cattle.

The fungus occurs as small globular masses, commonly about the size of a millet-seed, usually of a pale yellow color, but at times white, brown, green, or speckled, with a surface closely covered with palisade-like rows of clubbed bodies which give it a mulberry-like appearance. Each mass consists of a central core of closely woven threads, from which radiate a multitude of filaments which swell out at their ends into the club-shaped bodies before mentioned; these form the outer part of the mass, and cause its peculiar appearance. In man the clubbed bodies are commonly absent, and the growth consists of the radiating filaments alone. If seated in the tissues, each portion of fungus is surrounded by inflammatory products forming a nodule which in its structure may exactly resemble a tubercular granulation. If this is of recent growth, the cells immediately around the fungus will consist of round cells (granulation tissue); while, if the inflammatory process has been of longer duration, the central core of fungus may be surrounded by epithelioid and giant cells, outside which again is usually a zone in which the new connective tissue elements are maturing into a firm fibrous material. If the irritation is sufficiently intense, the inflammation goes on to suppuration, when the fungus lies detached in the abscess-cavity or is expelled with the pus; but this occurs by no means invariably.

The etiology of the disease is still obscure. The microörganism has never been recognized outside the body; and, apart from inoculation experiments, no direct relationship between the disease as occurring in the lower animals and as met with in man has been established. Israël is of opinion that both man and animals are probably infected from some common source, such as vegetables or water. Jensen (*Tidskrift f. Veterinaer*, xiii., 1883) traced an epidemic in Seeland to the eating of rye grown on land recently reclaimed from the sea; and Johne discovered a fungus closely resembling the actinomyces in grains of rye stuck in the tonsils of pigs. Israël is apparently inclined to hold that the malignant ray-fungus may under certain conditions develop from the harmless leptothrix found in the mouth.

There is strong evidence to associate the occurrence of the disease with the presence of carious teeth or dental fistulæ. In most of the recorded cases it is noted that the teeth were defective, and in several the malady originated at the site of decayed teeth or of a diseased portion of the jaw. In one instance reported by Israël (Congress of the German Sur-

gical Society, *British Medical Journal*, 1886, i. 797), where the lung was the seat of the growth, a piece of hollow tooth was discovered in the centre of the morbid area.

Attempts at cultivation of the microörganism have failed until the present year, when Prof. Boström, of Giessen, reports (*Jahresbericht über Path. Org.*, Baumgarten, 1886) that he has succeeded in making artificial cultivations of the fungus, which attain their maturity in five or six days, and present the typical appearance of actinomyces as occurring in man. He has not, however, produced the disease by inoculation of the growth thus obtained.

Inoculation experiments have been, to a certain extent, successful. Israël infected a rabbit by inoculation from man, and Ponfick produced the disease in calves by introducing portions of the tumor into the subcutaneous tissue, into the abdominal cavity, or into the veins.

The fungus may enter the body by one of three paths: the mouth and pharynx, the respiratory passages, and the digestive tract.

A. Invasion through the Mouth and Pharynx.—This occurs:

1. *From the lower jaw* (most frequently): the growth being connected with the jaw, or situated close to it, or in the submental or submaxillary region, or lower down in the neck. A remarkable feature in the history of actinomycosis is well illustrated in the case of growths occurring in the neck—that is, migration of the tumor. In one instance recorded by Israël, a tumor which in August was in the submaxillary region had by December reached the level of the thyroid cartilage. Not uncommonly the track of the growth may be recognized as an indurated band or cord extending from the jaw to the upper part of the tumor, and consisting of the cicatricial tissue resulting from the passage of the irritant, but in other cases there is no trace of its path. In yet other instances its course is marked by suppuration.

2. *From the upper jaw* (but seldom). Here the disease tends to affect the neighboring soft parts, to extend deeply into the adjacent tissues, and even to implicate the base of the skull and brain.

In typical cases the course of the malady in this region is slow and torpid, and for some time usually painless. The skin is not at first affected, but in many cases it is ultimately implicated; and when suppuration has occurred discharge will take place on the surface. In other cases the growth heals at one side by formation of cicatricial tissue with death of the fungus, while it extends at the other; and it is by this process that the tumor may shift its position in the manner described above. The prognosis is much more serious when the invasion is from the upper jaw rather than the lower, as there is a greater tendency to extension to deep structures. The only satisfactory treatment consists in the entire removal of the morbid tissue, and when the position of the growth is favorable a radical cure may be anticipated.

B. Invasion through the Respiratory Tract:

1. *Localization on the bronchial mucous membrane* (bronchitis actino-mycotica). A case is on record in which for seven years the patient suffered from general bronchitis without any evidence of implication of the lung-tissue proper or of impairment of the general health; the sputa throughout this period contained abundant actinomycotic granules. It is probable that in other instances this form passes into the next, where there is:

2. *Localization in the pulmonary parenchyma.* The course of this variety of the disease is divided by Israël into three stages:

a. When the lung only is affected. The microörganism sets up peri-bronchitis or pneumonia, the cells in the alveoli undergo fatty degenera-tion, and small yellowish-white tubercle-like masses are formed. Soften-ing frequently occurs in the nodules, associated with suppuration, and not uncommonly with capillary hemorrhages; and thus cavities are formed in the tumor which may become continuous by the breaking down of the separating tissue. During this time a diffuse growth of connective tissue is taking place in the lung around these centres of disease, which leads to compression of the alveoli, and ultimately to the transformation of the affected portion into a dense mass of connective tissue rich in elastic fibres, separated from the cavities above described by a thin wall of granulation tissue in which the characteristic growth is embedded. The symptoms during this stage are commonly obscure. Usually the patient cannot assign any exact date to the commencement of his illness; the first indication of the pulmonary lesion is slight cough with scanty expectoration, which may attract no attention. Physical examination at this period may or may not determine the existence of the disease, according as the consolidation of lung is sufficiently exten-sive and superficial or the reverse. The contraction of the lung may be so marked as to cause falling-in of the chest wall. The posterior and lateral portions of the lung are most commonly affected, and hitherto no case has been met with in which the apices have been involved. The sputa may be mucopurulent throughout, or pneumonic in character, or slight hæmoptysis may occur, and the microscope may reveal the exist-ence of the fungus.

b. When extension beyond the lung takes place. In this, the second stage, definite symptoms may first be recognized. Some degree of pleu-risy is commonly induced. The direction usually taken is toward the surface, most often posteriorly and laterally, the prevertebral tissues being frequently attacked; or the disease may extend downward behind the diaphragm to the retroperitoneal tissues, and thence to the neighbor-ing muscles. Or, secondly, the growth may pass through the diaphragm into the abdominal cavity; when diffuse peritonitis or a subphrenic abscess may result, or extension may take place directly into the liver

or the spleen; and in the latter case abscess in the organ attacked commonly results. Or, thirdly, the tumor may implicate the anterior mediastinum and the pericardium. As a rule, when the disease has extended beyond the lung, it spreads with increased rapidity. Definite symptoms are now present. Marked weakness usually exists, with an aspect of grave illness. Hectic, with profuse night sweats, commonly sets in; although the course of the temperature is by no means constant—being, in some cases, high, and in others low throughout. Irregular intercurrent rigors may occur.

c. When the skin has become implicated the third stage is reached. The superficial structures are generally attacked first, either over the chest or in the neighborhood of the dorsal or lumbar vertebræ; and the affection takes the form of a diffuse doughy infiltration, consisting of granulation tissue, which tends to spread widely. Ultimately the skin gives way, allowing the discharge of purulent fluid, or the débris of tissue, together with the characteristic fungus.

The duration of the disease, when it originates in the lung, is doubtful; from the commencement of definite symptoms it may last from five to twenty months; but it appears that a long period, probably from two to three years, may intervene between the attack on the lung and the death of the patient.

C. Invasion through the Digestive Tract:

1. *Localization on the surface of the mucous membrane.* In a case reported by Chiari the patient died with general marasmus after two years' illness; and the mucous membrane of the intestine was found to be almost universally covered with a white material, the mycelium of the fungus, occurring in patches raised in the centre and covered with yellow and brown granules, and closely adherent to the subjacent tissue.

2. *Localization in the substance of the intestinal wall,* with extension to neighboring parts. In this form, the actinomycotic tumors occur as small nodules seated in the mucous or submucous tissue. Softening tends to take place, leading to the formation of ulcers with undermined edges, the base of which may reach down to the muscular layer. Ultimately these ulcers may heal, leaving a simple scar. The conditions are more favorable to spontaneous cure in this form of the affection than in any other, as has been pointed out by Israël; the expulsion of the softened contents of the nodules is favored by the peristalsis of the intestine, and they are removed from the body by the ordinary action of the bowel; and thus a cicatrix may remain as the only evidence of previous actinomycotic infection. In most cases, however, the disease will spread to adjacent parts. The liver may be secondarily affected, usually through the portal system; but, in one instance, infection of this organ occurred from the vermiform appendix through an abscess-track in the retroperitoneal tissue.

As long as the intestinal tract only is affected there may be a total absence of symptoms, or the catarrh induced may have no characteristic features; and thus no suspicion of disease may arise until extension to other parts has occurred, when the symptoms induced will vary with the direction taken by the growth. Microscopic examination of the stools may reveal the presence of the fungus, and if the bladder has become affected the organism may be detected in the urine. Treatment in cases of the intestinal variety is necessarily in most cases palliative only, but in one instance Esmarch effected a cure by operation.

Whatever the primary seat of the disease, in any case of actinomycosis generalization of the growth by embolism may occur, and this not uncommonly after the tumor has long had a comparatively inactive local existence. The dissemination of the fungus will be accompanied by irregularly recurrent rigors and the usual symptoms of hectic.

The history of the following case illustrates the course of actinomycosis when the lung is primarily attacked, and presents certain features of special interest.

A. J. B., married, aged twenty-eight, was admitted into the Bristol General Hospital under the writer's care on October 31, 1885. He lived in Bristol, and was by occupation a house decorator.

In the family history the only facts worthy of note were that the patient's father died of consumption when fifty-four years of age, and that a brother was carried off by acute phthisis at the age of twenty-four.

The patient had enjoyed good health up to Christmas, 1884, when he was confined to bed for three weeks with inflammation of the bowels. The house in which he lived was situated between a churchyard and an old burial ground, and its water supply was from a well. About three months before his admission the water, after heavy rain, became black and foul, and remained so for six weeks; he did not drink it while it was at its worst, but had done so for the last six weeks. There had been no other case of illness in the house. For the last three months the patient had been exposed to much worry and anxiety, and had not felt in his usual health; but about five or six weeks before admission he first definitely noticed that he was becoming listless and apathetic, and that his appetite was failing. About three weeks before admission he was suddenly seized under the right costal cartilages with a sharp pain on breathing, increased by lying upon either side, and this persisted until he came under observation. Of late, a sensation of fulness in the stomach had existed, but there had been at no time any sickness or diarrhœa, nor had rigors occurred. There had been marked loss of flesh and strength during the recent illness, and within the last fortnight profuse night sweats had set in.

On admission the patient was sharp-featured, pale, and thin, and presented the aspect commonly considered to be associated with a tubercular tendency. His chief complaint was of acute stabbing pain under the right lower costal cartilages, increased by deep breathing and by cough, as also by twisting the body. The respirations were 36 to the minute and shallow, and the pulse was 84 and rather weak. Physical examination of the lungs and the heart revealed nothing abnormal except

somewhat weak breathing over the right base posteriorly. The abdomen was rather distended, the liver dulness reached from the sixth rib to two inches below the margin of the thorax, and the organ was elastic, smooth, and rounded, and slightly prominent above, its anterior surface passing downward and somewhat backward to the free edge. Tenderness existed in the epigastrium and over the liver along the thoracic margin. The tongue was dry and furred, the teeth were decayed, and the breath was offensive. No other evidence of disease existed.

During the three weeks following admission the patient's chief trouble continued to be the pain and tenderness along the margin of the thorax. At the end of this time there was an appearance of fulness extending upward over the lower part of the right side of the thorax and downward over the liver, the lower intercostal spaces being partially obliterated. The free margin of the liver was now about three inches below the edge of the thorax. There was some degree of dulness, with weakened breath sounds and voice signs, over the right front, from the level of the fourth cartilage downward, continuous below with the liver-dulness; and over the right back dulness with weakened respiratory sounds, most marked from the base to the angle of the scapula, and becoming less definite upward to the scapular spine. The heart's apex was not appreciably displaced. Cough, with mucopurulent sputa, was now present. Loss of flesh was progressive, and profuse night-sweating continued. Reference to the chart shows that the temperature had been febrile throughout, and of a very irregular type—the lowest daily temperature varying from 98° to 100.2°, the highest from 100.4° to 103°, and the daily range varying from 0.8° to 4.3°. No rigors had occurred.

FIG. 1.
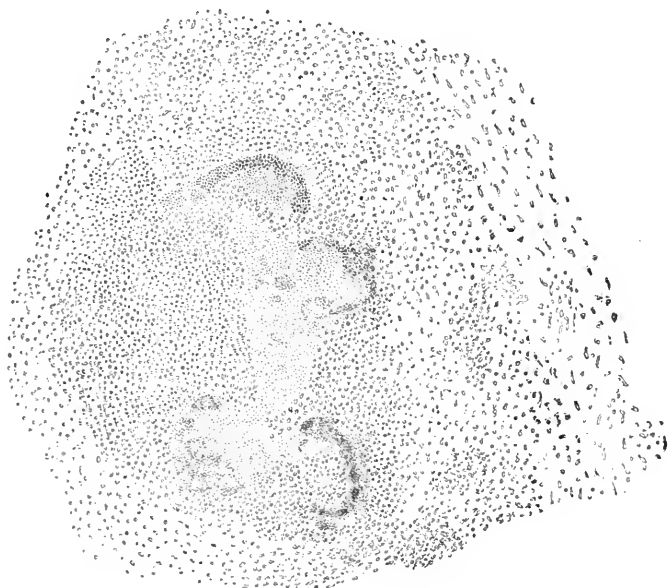
Each group lies surrounded by leucocytes, and these by connective tissue—more fine in Fig. 3.

An exploring needle was now introduced (November 18th) at various points over the area of thoracic dulness both in front and behind, and also into the liver; but with negative result.

By November 27th the heart's apex had become displaced outward

to the nipple line, and the dulness and diminution of breath-sound over the right side were more pronounced. Accordingly on that day an aspirator needle was inserted into the ninth interspace posteriorly, and a small amount of clear serous fluid was withdrawn. It was to be noted that during the whole of this period there was but little subjective sense of illness, the patient often expressing himself as feeling very well, except for the pain in the side.

Fig. 2.
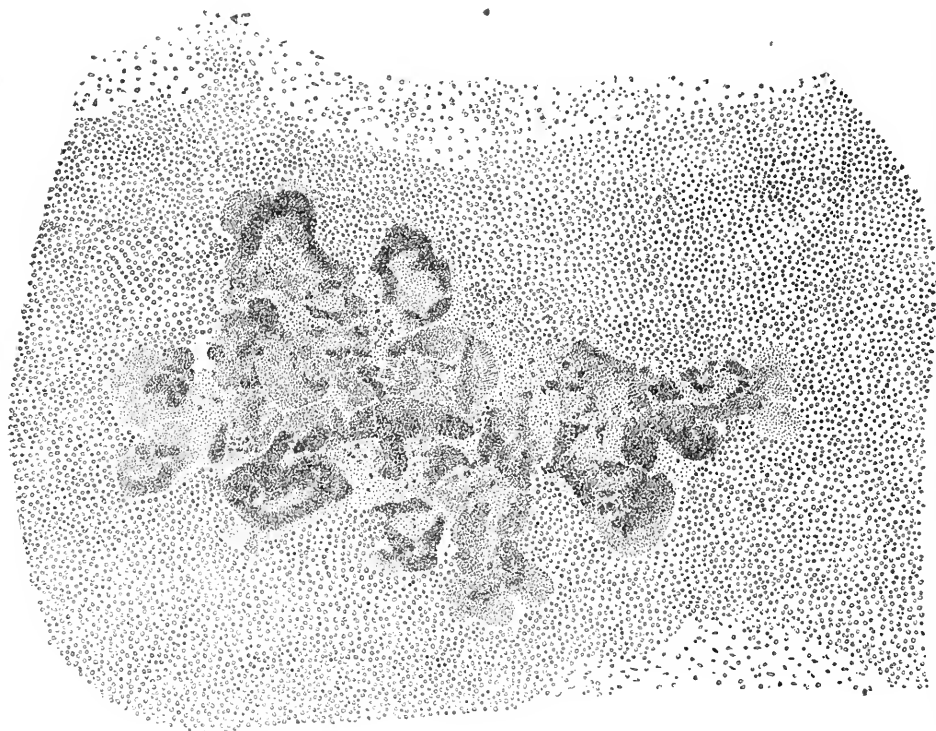
Two groups $\times$ A Zeiss ($= \frac{3}{5}$ inch) to show general arrangement of larger groups. Fig. 3 shows well the gyrate mode of growth by decay of parts of circles and the intersection of others: cf. erythema gyratum, etc. In Fig 4 the "rosetted" appearance of group is shown; in this it is seen that each segment of growing fungus is broader and more distinctly striated than in Fig. 3.

During the next month the chief change was in the lung symptoms and signs. Cough became much more frequent, and was accompanied by abundant mucopurulent expectoration, repeated microscopic examination of which gave a negative result. There was no evidence of increase of the pleuritic effusion, but high-pitched moist râles were more or less distinctly heard over the affected area. The night sweats and the hectic temperature continued.

On Janury 11, 1886, a loud rough diastolic murmur was detected, having its maximum over the fifth right costal cartilage about three inches from the middle line, and being well conducted over an area of about two inches, outside which it was quickly lost; and it could not be traced to the cardiac region. It was loudly audible at each examination for seven days, and it then abruptly disappeared.

During January marked improvement in the condition of the right side of the thorax took place. The upper limit of dulness fell to the

fifth cartilage, and over the whole area the absence of resonance became much less absolute, until, on January 18th, redux friction was first heard. At the same time the breath-sounds became clearer and the moist râles fewer. On the 21st and 22d of this month the sputa were colored with bright blood. From this time onward to the termination

FIG. 3.   FIG. 4.
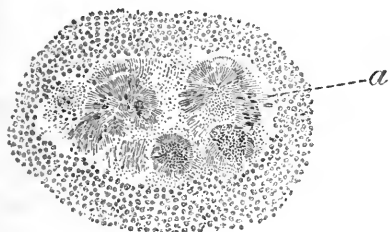
A group × A Zeiss (= $\frac{3}{5}$ inch) shows probably the earliest stage of growth : each separate collection of fungus consisting of fine filaments radiating from a common centre.

The portion of fungus marked *a* in Fig. 3 × D Zeiss (= $\frac{1}{7}$ inch nearly). Under this power some of the filaments are apparently thicker than the majority, and are club-shaped.

of the case the thoracic condition ceased to form a prominent feature in the patient's state; the dulness became gradually less marked, but never completely disappeared at the base in front and behind; breath-sounds were audible with normal intensity, except over the area of persistent dulness, and the moist râles ultimately were but few. At the same time the cough became much less troublesome, and the sputa markedly lessened in amount.

On January 14th a new epoch in the clinical history was ushered in by a severe rigor, and from this time the phenomena were those of suppuration with its accompanying systemic disturbance. Rigors followed on January 15th, 16th, 17th, 19th, and 29th, and on February 2d, 6th, and 9th. During this period there was no definite change in the physical signs, except that on February 12th the patient complained of very sharp pain over the region of the heart, and extensive pleuritic friction of cardiac rhythm was discovered. The colliquative sweatings continued; emaciation became extreme; and at length, after several days of apyrexia, the patient died from exhaustion on February 21st, sixteen weeks after admission.

There was at no time any vomiting, diarrhœa, or jaundice, and the results of exploratory puncture and of examination of the sputa were negative throughout. The treatment adopted does not call for special comment.

At the post-mortem examination it was found that the right lung was adherent to the chest wall, and that its base was firmly fixed to the diaphragm, as was the latter to the upper surface of the liver. The lower lobe of the lung adherent to the diaphragm was tough, firm, and airless; and on section it was seen to be transformed into a dense uniform mass of fibrous tissue, pale, glistening, and semi-translucent, and resembling in appearance the connective tissue infiltrations sometimes caused by syphilis. No trace of normal lung structure or of morbid growth was visible to the naked eye.

Opposite to its adhesions to the lung the diaphragm was, as above stated, closely bound down to the most prominent part of the upper and anterior aspect of the liver by dense fibrous tissue, which was dissected off with difficulty. It was then evident that there was a yellowish-white mass, about three inches in diameter, in the substance of the liver, coming to the surface where the adhesions to the diaphragm existed. When this tumor was cut into, it presented an appearance which is probably peculiar to actinomycosis. The growth measured about three and one-half inches antero-posteriorly, and about four and one-half inches vertically and transversely; it lay chiefly in the right lobe, but extended across so that its left end was seated in the left lobe of the liver. Its surface was bathed in pus, but in spite of its large size there was no sign of any definite abscess cavity, nor was the tissue at the centre broken down to any greater degree than that near the circumference. When the cut surface was washed the structure of the tumor became evident. A stroma of abundant fibrous tissue formed a felt-like or honeycombed mass, in the meshes of which were small loculi or spaces varying in size, some being scarcely visible to the naked eye, while others would contain a mustard seed or a pea. From many of

FIG. 5.
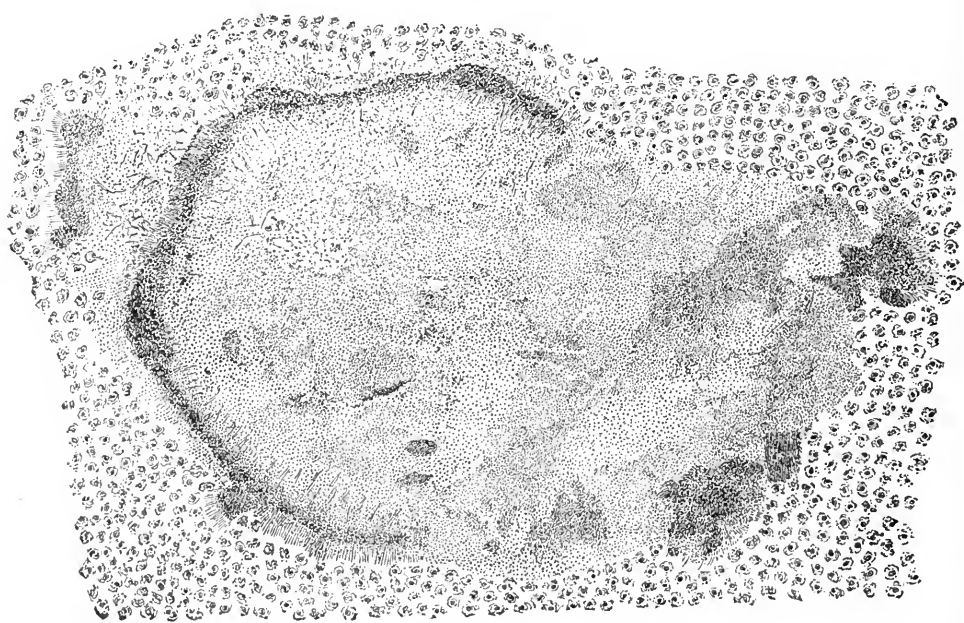
$\times$ D Zeiss ($= \frac{1}{7}$ inch nearly). The deeply stained portion is the more actively growing part of the fungus. It shows a more or less evident striation. At its edge is a fine filamentous network stretching into the adjacent mass of leucocytes. The central parts, lightly stained, and of a homogeneous or structureless appearance, indicate the dead tissue over which the ringed growth has already passed.

these spaces could be extracted the little spherical bodies before described as characteristic of actinomycosis. The tumor presented an irregularly lobulated outline, determined by the direction in which the growth was extending into the liver tissue around. Several separate centres of fungus existed as small patches in the substance of the liver in the neighborhood of the primary mass, and pus was visible in adjacent veins. In the lower lobe of the left lung near the anterior surface

was a secondary abscess, and over it an extensive patch of recent lymph. The other organs were healthy. No cause for the murmur which existed for a short time could be found; and it is probable that the sound was produced in a branch of the pulmonary artery involved in the change which was taking place in the lung tissue.

The microscopical structure of the tumor in the liver is well shown by the accompanying illustrations from elaborate and accurate drawings made for the writer by his friend and colleague, Dr. Michell Clarke, to whom he is also indebted for the original sections. It is evident that the fungus does not present a uniform aspect; and it appears that two distinct modes or stages of growth exist. In Fig. 2 the "rosetted" form usually described is seen, where the radiation of the threads from a common centre is evident, and the growing fungus is broad and distinctly striated; while in Fig. 1 the line of spreading fungus is narrower, the striation is less distinct, and the "fairy-ring-like" mode of growth is shown—indicative probably of the death of certain segments of the circumference of widened circles of fungus, and peripheral extension of the surviving portions. In Fig. 1 the dark narrow median zone of the growth takes the stain much more deeply than does the corresponding wider portion in Fig. 2. Each group is surrounded by leucocytes, outside which again is more mature connective tissue; and it is worthy of note that the fibrous tissue approaches much nearer the variety of growth represented in Fig. 1 than it does that exemplified in Fig. 2. It will be seen that epithelioid and giant cells are absent, as is usual in man. Within the ring of fungus is visible the débris of the tissue over which the growth has passed. It is probable that these differences in appearance are determined by the age of the fungus and the supply of nutritive material —that Fig. 2 represents an earlier stage, when there is abundant food for the microörganism; while Fig. 1, in which the individual filaments are dwarfed, illustrates the effect of the partial exhaustion of the nutritive material or the existence of a less congenial soil. This view is borne out by the relation of the connective tissue to the groups in the two cases; in Fig. 2 there is a wide zone of leucocytes and the formed connective tissue is still at a distance, while in Fig. 1 the leucocytes are much fewer and the maturing fibrous tissue more closely approaches the fungus—an indication of greater chronicity and, therefore, of less activity than has obtained in Fig. 2. When the microörganism dies out in the affected tissue, it is probable that this result is determined by an intensification of the conditions which are depicted in Fig. 1. Figs. 4 and 5 are high-power drawings of these two varieties of growth; in these it is seen that the fungus appears to consist of a network of filaments matted together in the middle of the advancing ridge, and spreading radially outward amongst the surrounding leucocytes. In Fig. 4 certain somewhat club-shaped bodies are apparently present; but out of a large number of sections these are visible in only two or three, and it is open to doubt whether the appearance may not be due to an accidental arrangement of the fine filaments which constitute the bulk of the growth.

It is remarkable that no trace of liver-tissue is visible in any of the sections. The first effect of the presence of the fungus in a part appears to be to cause aggregation of leucocytes, which destroy the preëxisting tissue; and it is in the granulation tissue thus formed that the organism spreads.

In the lung (Fig. 6) the affected portion is transformed into a mass of fibrous material, in which the remains of the pulmonary vesicles and their epithelial lining are here and there visible. Out of a large number of sections examined, the fungus exists in only one, and in this it is seemingly about to disappear before the connective tissue.

FIG. 6.
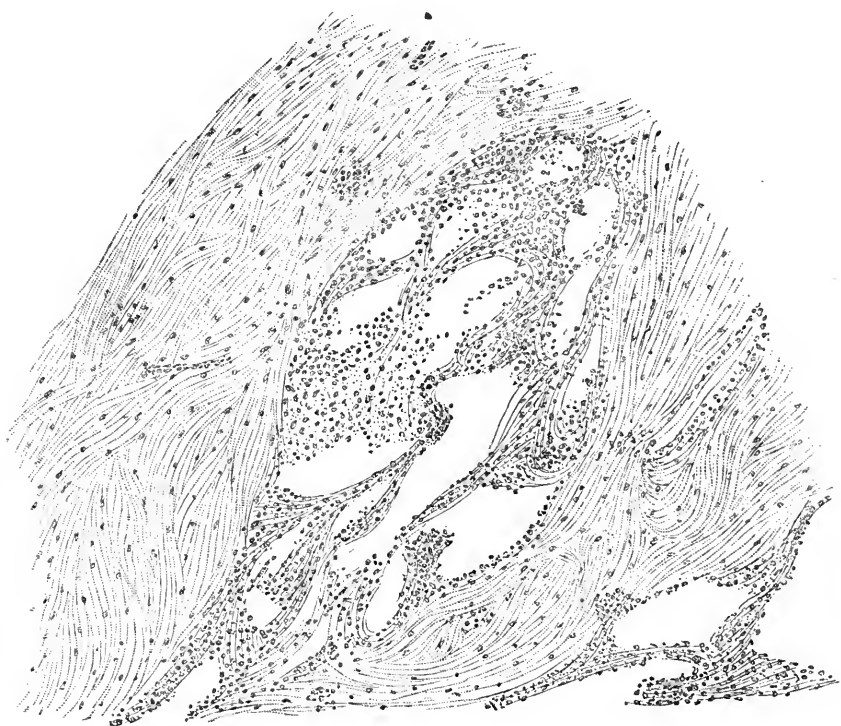
From lung. × Zeiss A. The section shows a portion of the affected lung—dense cicatricial fibrous tissue, with much elastic tissue, inclosing remains of alveoli in which the epithelium has proliferated. In this section the proportion of alveolar remains to fibrous tissue is unusually large.

The clinical history of the case recorded closely follows Israël's description of the course of actinomycosis originating in the lung. The patient was unable to assign any definite date to the outset of his illness; but doubtless during the three months of failing health the fungus had been growing in the lung, and the acute pain which led to his seeking advice ushered in the second stage of the disease—that of its extension beyond the pulmonary tissue to the pleura, and thence through the diaphragm to the upper surface of the liver. The irritation of the pleura resulted not only in the formation of dense adhesions at the base of the lung, but also in the effusion of serum above; and it is worthy of note that recovery from the pleurisy took place, the fluid becoming absorbed.

There is clear evidence that at one time the lung was much implicated in the disease. This is shown by the occurrence of pleurisy, the existence of abundant high-pitched râles indicative of pneumonic consolidation from irritation, and the accompanying cough, expectoration, and fever. As time went on, the fungus was expelled from the lung, and

the affected area became transformed into a mass of dense cicatricial fibrous tissue. This change was marked by gradual disappearance of the pleurisy and of the moist râles, and notable lessening of the cough and the amount of the sputa. During this time, however, the temperature (with its concomitant symptoms) was kept up by the continued invasion of the liver by the new growth. The occurrence of actual suppuration was indicated by the first rigor; the succeeding rigors marked the extension of suppuration to fresh areas of liver tissue; and the final rigor accompanied the secondary pleuro-pneumonia which attacked the left side shortly before death.

The case affords a striking illustration of the migration of an actino-mycotic tumor. Just as a growth in the neck may, as before described, descend from the jaw to the thyroid cartilage, its track being marked by an indurated band of cicatricial tissue passing from the jaw to the migrated mass, so here did the tumor pass from the lung through the diaphragm to the liver, leaving as evidence of its path the cicatricial band of lung-tissue directly continuous with the liver by adhesions. Whether or not this process of removal from the lung was aided by the occurrence of suppuration and destruction of the pulmonary tissue, with expulsion of certain portions of the fungus by the bronchial tubes, is uncertain; but the clinical indications of suppuration did not occur until the improvement in the lung had taken place, and therefore, in all probability, were due to the liver rather than to the lung. There was no evidence post-mortem of the existence of the cavities, which, in other recorded cases, have been produced during the disintegration of the pulmonary tissue.

The duration of the disease after the occurrence of definite symptoms was sixteen weeks; and from the first indication of failing health twenty-eight weeks.

The diagnosis was a matter of difficulty. On the patient's admission typhoid fever, acute tuberculosis, and inflammation in the region of the lung and liver were discussed. Enteric fever was soon eliminated by the continued absence of its special symptoms, and the development of the signs of local mischief. It was much more difficult during the next period of the disease to exclude acute phthisis, inasmuch as the family history was in accordance with this theory, the general symptoms were such as are met with in this malady, and the local signs were not inconsistent with its existence. When, however, the thoracic condition underwent no marked improvement, and rigors nevertheless set in, it became evident that suppuration had occurred in the liver; and amongst the various possible determining causes of such an event, actinomycosis was suggested by the writer's friend, Dr. Michell Clarke. Failing the discovery of the fungus, however, the exact nature of the lesion could not be made out during life.

In a late stage, the treatment of actinomycosis of the lung is as hopeless as that of cancer under similar conditions; but if the diagnosis of the disease can be made before the extension of the growth from the lung to adjacent parts, and if the site of the lesion can be accurately determined by physical examination, it is possible that a radical cure may be effected by removal of the diseased tissue. For if excision of a portion of the lung is justifiable under any conditions, it is permissible in the case of a disease which appears to be so strictly localized at its outset, and which will so certainly ultimately spread more or less widely with fatal results. From the evidence at present available, however, it is most doubtful whether the growth can be detected and localized sufficiently early in its course to insure its complete extirpation; for when once the second stage—the stage of prominent symptoms—is reached, surgical interference can be of no avail.

Equally useless would be incision of the liver-abscess in such a case: for it is evident from the structure of the tumor that the pus cannot be drained from it, as was proved in a case recorded by Dr. Harley (*British Medical Journal*, 1885, ii. 1018); and a reference to the condition of the liver, as previously described, will demonstrate that, owing to the dissemination of the fungus through its tissue, nothing short of extirpation of the entire organ can insure the removal of the whole of the morbid growth.

IS THE "KNEE-KICK" A REFLEX ACT?

BY WARREN P. LOMBARD, M.D.

THE experiments here recorded were made in the Physiological Laboratory of the College of Physicians and Surgeons. I take this opportunity to express my thanks to Dr. John G. Curtis for his kind advice and assistance.

CHARACTER AND RESULTS OF THE EXPERIMENTS.

The object of the research described in this paper was to determine whether the time between the moment of the blow on the ligamentum patellæ and the beginning of the following contraction of the quadriceps muscle, is long enough to permit the phenomenon to be a reflex act. The result was the discovery that this period was only about one-fourth as long as that required for a skin reflex from the knee, and very little longer than that seen when the quadriceps muscle is incited to action by direct electrical stimulation.

CURRENT THEORIES.

Since 1875, when the attention of physicians was first called to the diagnostic importance of the phenomenon known as "knee phenomenon," "patella-tendon reflex," "knee-jerk," "knee-kick," "myotatic contraction," etc., there has been much thought given to the subject. The literature is already considerable. I have beside me over a hundred references, and there are undoubtedly many more. It would seem that there could be little new to say, but, in truth, all this work has not definitely determined the nature of the process, and it is not known to-day whether it is a reflex action or not.

There are two leading views concerning the matter; the one regards the contraction of the quadriceps muscle which follows a blow on the ligamentum patellæ as a reflex act, the other considers that it is due to mechanical stimulation of the muscle fibres. It has also been proved by experiments that the organ stimulated is, under normal conditions, not in the skin and not in the part of the tendon struck, but that it is situated at a distance, and is simulated by the sudden twitch and by the vibrations of the tendon, resulting from the blow. The nerve fibres which have been discovered in the tendon, near its attachment to the muscle, and in the sheath and the interstitial tissue of the muscle, as well as the muscle fibres themselves, are capable of being excited to action by mechanical stimuli, and they both seem to be in position to be affected by any sudden jerk or vibration of the tendon. Which of these organs is stimulated? If it be the afferent nerve fibres, the action is reflex; if it be the efferent nerve fibres or the muscle fibres, it is a local phenomenon. Both those who regard the knee-kick as a reflex act and those who consider it an entirely muscular operation admit that the integrity of the reflex arc is necessary to the phenomenon, for this has been proved by physiological experimentation as well as by clinical and pathological observations.

The chief argument in favor of the reflex idea is simply that the undoubted influence of the cord over the phenomenon can be satisfactorily explained in no other way. An explanation is given, however, by those who consider the process to be entirely muscular. They claim that the irritability of the muscle to mechanical stimuli is dependent on the tonus of the muscle, and that this condition is dependent on a continuous shower of weak reflex impulses from the cord. The loss of any part of the reflex arc is followed by a loss of muscle tonus, and, consequently, by a loss of the "knee-kick." The strength of this theory is somewhat impaired by the fact that we know little or nothing concerning muscle tonus, and that some observers state that it is not to be discovered by the most careful methods of experimentation.

The great argument advanced against the theory that the "knee-

kick " is a reflex act, is based on experiments which are thought to show that the time elapsing between the moment of the blow on the ligament and the beginning of the contraction of the quadriceps muscle is too short for a reflex action.   Thus the majority of observers find the interval to vary between 0.030 second and 0.040 second, except under abnormal conditions, when, in lateral sclerosis, for example, it has been found as short as 0.016 second.   Such intervals of time are compared with the presumable reflex time, and are found to be three times as short as they should be were the action a reflex process.

The reflex time for such an act as the " knee-kick " is, unfortunately, unknown and has to be calculated.   Thus, it is said that the whole reflex time is the sum of: 1. The time required for the transmission of the nerve impulse through the afferent and efferent nerves (a distance of $1\frac{1}{2}$ metres at the rate of 30 metres a second), 0.045 second ; 2. The time occupied by the reflex processes within the spinal cord (according to Exner's determinations from experiments on winking), 0.055 second ; and, 3. The latent period of the muscle (determined on frog's muscle), 0.010 second.   The whole reflex time is, therefore, said to equal about 0.110 second, while the interval between the blow and the contraction of the quadriceps equals only 0.030–0.040 second.

The champions of the reflex theory can scarcely doubt the accuracy of the experiments in which so many competent observers have gained the same results, but they answer that the time of such a reflex act as the " tendon reflex " may well be much more rapid than that which has been calculated.   Thus, some observers have stated the rate of transmission of nerve force at 90 metres a second, instead of 30 metres, the assumed rate.   The time Exner found for winking may not at all apply to processes in the lumbar cord.   One has no right to judge the latent period of man's muscle from that of frog's muscle.   In fact, there is no proof that the " tendon reflex " is not a very rapid reflex act.

And thus the question is left undecided, neither party being able to advance any absolutely conclusive argument.

Experiments by the Author.

Study of the work already done on this subject led me to think that it was quite possible that the contraction of the quadriceps muscle following a blow on the ligamentum patellæ was a compound act; that both sensory nerve fibres and muscular fibres were stimulated by the twitch ; and that the contraction was due, first, to direct mechanical stimulation of the muscle fibres, and, second, to reflex nerve impulses. This might well be the case, and yet the two movements might be so fused together that the unaided eye would be unable to distinguish them. The idea naturally suggested itself, that, by the graphic method, one might get a curve which would reveal the influence of two separate im-

pulses. Moreover, one could measure the intervals of time elapsing between the moment that the blow was struck and the instant that each of the waves of contraction, resulting from the two impulses, should begin to show itself, and could compare these intervals with the period elapsing before the contraction of the muscle when it was stimulated directly by an induction current, or, reflexly, by an impulse coming from the skin near the knee. If when the ligamentum patellæ was struck, two oscillations of the curve of contraction should be seen, and two intervals should be obtained which corresponded, the one, with those got when the muscle was stimulated by electricity, and the other, with those got when the muscle was stimulated by reflex impulses, the cause of the contraction would be evident. If, on the other hand, no second interval should be seen, it would be no proof that the act was a simple one; but the time elapsing before the beginning of the contraction might be found to correspond to one or the other of these periods, and at least the true nature of the beginning of the phenomenon might thus be disclosed.

Accordingly, a number of experiments were made, in which the moment when the stimulus was applied and the moment when the quadriceps muscle had contracted sufficiently to move the foot were accurately recorded. The stimulus was applied in three different ways, viz.: 1. Directly to the muscle, by an induction current sent into it through the skin; 2. Indirectly, by a blow on the ligamentum patellæ; and, 3. Reflexly, by means of irritants employed on the skin near the knee. A study of the form of the curves and of the intervals of time thus obtained gave the following results.

Under normal conditions, when the ligamentum patellæ is struck, the curve of the resulting contraction of the quadriceps muscle shows an unbroken rise, followed by an equally regular fall, and presents no peculiarity which would suggest that the muscle had received more than one stimulation.

The shortest interval between the moment of stimulation and the beginning of the contraction, as registered by the movement of the foot, is seen when the muscle is stimulated directly by the induction current; the next shortest, when it is stimulated by a blow on the ligamentum patellæ; and the longest, when it is stimulated by a reflex impulse coming from the skin near the knee. The time determinations of these intervals were gained in each case by the same apparatus, and can, therefore, be safely compared.

The following table shows the percentage in which an interval of any given length occurred in the experiments of each day, and in the total number of experiments, made with each of the three methods of stimulation. Under Series I. are grouped all that series of experiments in which the rectus was stimulated directly by electricity; under Series II. are grouped those experiments in which the stimulus was a blow on the

ligamentum patellæ; and under Series III. are grouped those experiments in which the muscle was stimulated by a reflex impulse from the skin near the knee. The experiments of different days are placed in separate columns, and the letter beneath the date represents the name of the man experimented on. At the left hand of the table, beneath the word seconds, is a column of the intervals seen to elapse between the moment the stimulant was applied and the moment the foot began to be moved by the contracting quadriceps muscle. On the same line with each interval is seen the percentage of the experiments of each day in which that interval occurred; and at the right hand of the table, under I., II., III., stand the percentages of all the experiments having this interval by each of the three methods.

At the bottom of the table are two lines of figures arranged by series and dates. The upper line gives the number of experiments made on each day by each method of irritation, and also the total number of experiments made with each method of irritation. The lower line gives the average length of the intervals obtained from these experiments.

A glance at this table shows a great similarity in the length of the intervals in the experiments of Series I. and Series II., whilst the intervals of the experiments of Series III. are all very much longer than these. A comparison of the lengths of the average intervals got from experiments in Series I. and II.—i. e., from experiments in which the muscle was stimulated by the direct application of electricity, and those in which it was stimulated by a blow on the ligamentum patellæ—reveals a difference of only 0.007 second. This similarity suggests a similarity in the phenomena. Comparison of these average intervals with the average interval of experiments in Series III.—that is, those in which the muscle was stimulated by a reflex impulse from the skin—discloses the fact that the average interval for experiments in Series III. is three to four times as long as the average intervals of experiments in Series I. and II.

How far may these average intervals be trusted for purposes of comparison? In all experiments marked variations in the length of the intervals were seen. They were least when the muscle was stimulated by electricity, more when the stimulant was a blow on the ligamentum patellæ, and by far the greatest when the stimulus was of reflex origin.

When the muscle was excited to contraction by direct electric stimulation, the average length of the intervals obtained from the experiments of each day was between 0.060 second and 0.070 second; the length of the average interval got from all the experiments was 0.064 second; and 47.5 per cent. of all the experiments had intervals ranging between 0.060 second and 0.070 second. Outside of these limits the variations were as follows: 29.4 per cent. had shorter, and 23 per cent. had longer intervals. These figures make it evident that 0.064 second is a just average interval.

TABLE OF PERCENTAGES, ETC., JANUARY AND FEBRUARY, 1886.

Seconds.	Series I. Feb. 5. A.	Feb. 8. B.	Feb. 9. C.	Feb. 23. D.	Feb. 25. D.	Series II. Jan. 21. A.	Jan. 26. B.	Feb. 5. A.	Feb. 6. D.	Feb. 8. B.	Feb. 9. C.	Feb. 23. D.	Feb. 25. D.	Series III. Jan. 26. B.	Feb. 8. B.	Feb. 9. C.	Feb. 23. D.	Feb. 25. D.	Total I. A,B,C, and D.	Total II. A,B,C, and D.	Total III. B,C, and D.
0.03–0.04	…	…	9	…	…	…	…	…	…	…	…	…	7	…	…	…	…	…	1.6	0.9	
0.04–0.05	…	6	…	…	…	29	9	…	…	11	9	…	43	…	…	…	…	…	1.6	12.3	
0.05–0.06	20	40	27	30	13	71	9	60	…	…	4	…	36	…	…	…	…	…	26.2	17.5	
0.06–0.07	40	20	46	50	80	…	9	20	…	11	18	7	7	…	…	…	…	…	47.5	8.8	
0.07–0.08	30	20	9	20	7	…	55	20	63	33	23	39	…	…	…	…	…	…	16.5	28.1	
0.08–0.09	10	7	9	…	…	…	9	…	37	23	27	35	7	…	…	…	…	…	4.9	20.9	
0.09–0.10	…	…	…	…	…	…	…	…	…	…	5	16	…	…	…	…	…	…	…	5.3	
0.10–0.15	…	7	…	…	…	…	9	…	…	11	14	3	…	16	8	…	…	…	1.6	5.3	2.1
0.15–0.20	…	…	…	…	…	…	…	…	…	11	…	…	…	17	25	…	…	8	…	0.9	10.4
0.20–0.25	…	…	…	…	…	…	…	…	…	…	…	…	…	17	42	34	34	75	…	…	43.7
0.25–0.30	…	…	…	…	…	…	…	…	…	…	…	…	…	50	…	33	33	17	…	…	18.7
0.30–0.35	…	…	…	…	…	…	…	…	…	…	…	…	…	…	17	33	33	…	…	…	22.9
0.35	…	…	…	…	…	…	…	…	…	…	…	…	…	…	8	…	…	…	…	…	2.1
No. of experiments	10	15	11	10	15	14	11	5	8	9	22	31	14	6	12	9	9	12	61	114	48
Average interval	0.068	0.067	0.061	0.063	0.063	0.052	0.075	0.060	0.079	0.090	0.077	0.082	0.051	0.271	0.232	0.268	0.270	0.226	0.064	0.071	0.253

When the muscle was stimulated by a blow delivered on the ligamentum patellæ, the average length of the intervals obtained from the experiments of each day varied from 0.050–0.090 second; the length of the average interval got from all the experiments was 0.071 second; and 36.9 per cent. of all the experiments had intervals ranging from 0.060–0.080 second; 30.7 per cent. had shorter, and 32.4 per cent. had longer intervals. Thus, though one must remember that the intervals varied widely, one can fairly state the average interval at 0.071 second.

Similarly, it may be said that the average interval obtained from experiments in Series III. may fairly be accepted for purposes of comparison.

Before any conclusion as to the similarity or dissimilarity of these phenomena can be based on a comparison of their average intervals, one must ascertain upon what the differences in the average intervals depend. An analysis of the interval recorded as elapsing between the moment that the stimulus was applied and the moment the foot began to move in response to the contraction of the quadriceps muscle, shows that it is made up of the following periods, viz.:

1. The time occupied by all the processes occurring between the moment the stimulant is applied and the moment the stimulus reaches the muscle. This period would vary with each form of stimulant, and would depend on the length and the nature of the path which the stimulus had to travel.

2. The time required for the muscle to respond to the stimulus. The latest observations state the latent period of the normal frog's muscle at about 0.003 second. We do not know the latent period of man's muscle. It would, without doubt, vary with the irritability of the muscle. As in these experiments the subjects were normal and were placed under the same conditions, the latent period of the muscle can be regarded the same in all the experiments.

3. The time required for the muscle to contract enough to move the foot. This would depend on—

a. The tension of the muscle at the time it was irritated. This was very slight and was apparently the same in all the experiments.

b. The amount the contracting muscle was stretched by the resistance of the leg, etc. This was the same in all experiments.

c. The time required for the contracting muscle to overcome the inertia of the limb and of the recording apparatus. This would be, probably, about the same as the time required to register the jar of the blow. This period was determined by fifty experiments to be about 0.013 second. It was about the same in all experiments.

d. The number of muscle fibres irritated, which would vary with the nature of the stimulant, its strength, and the method of its application.

e. The strength of the stimulus.

4. All the intervals recorded are 0.003 second too short, for this amount of time was lost by the electro-magnet in recording the moment of the blow.

The periods numbered 2, 4, and *a*, *b*, and *c*, under 3, were the same for all forms of experiments and need not be further considered. Any differences seen between the average intervals obtained by the three different methods of experimentation were dependent on differences in the length and nature of the paths which the stimulus had to travel; on differences in the number of muscle fibres stimulated, due to differences in the nature, strength, and method of application of the stimulant; and on differences in the strength of the stimulus.

How far would those causes which determine the activity of the contraction of the muscle affect the result? In the case of experiments in which the muscle was stimulated by electricity, the electrodes were only six inches apart, and, therefore, comparatively few muscle fibres were directly stimulated; the stimulus may have spread to many others, however, by means of the nerves which were excited. The stimulant employed was of medium strength, an induction current being chosen which just sufficed to cause an undoubted movement of the foot. These facts would lead one to surmise that a comparatively long time elapsed between the moment that the stimulus reached the muscle and the moment the foot began to move in response to its contraction.

In the case of experiments in which the muscle was stimulated by the results of a blow on the ligamentum patellæ, if the stimulation was reflex, all the muscle fibres must have been stimulated in each experiment; if the stimulation was effected by direct excitation of the muscle fibres, the number of fibres stimulated must have varied with the tension of the muscle, the force of the blow, and the place struck. The strength of the stimulus, though undoubtedly very variable, was, to judge from the extent of the movement of the foot, in most experiments, considerable. These facts lead one to believe that a comparatively short time elapsed between the moment that the stimulus reached the muscle and the moment the foot began to move in response to its contraction.

There is no way of accurately determining how many muscle fibres were stimulated by either method of experimentation, or what was the relative strength of the stimulants employed. The above facts, however, would lead one to infer that the contraction of the muscle would have been comparatively slow in experiments in which the muscle was stimulated by electricity, and, so far as this influence could have determined the result, that the average interval would have been somewhat longer in these experiments than in those in which the muscle was stimulated by the results of a blow on the ligamentum patellæ. In reality, however, the reverse was true, and the average interval of experiments in Series I. was 0.007 second shorter than that of experiments in Series II. This

result can be due only to the other factor which goes to determine the length of the intervals—that is, the length and nature of the paths which the stimulus had to travel in the two cases. The stimulus has, then, to pass by a longer path in the case of experiments in which the ligamentum patellæ is struck than in the case of those in which the quadriceps is stimulated by electricity; and this difference in the length and nature of the paths is enough to make the average interval of the experiments of Series II. not only as long, but 0.007 second longer than that of the experiments of Series I. As has been said, there is no way of determining what effect the possible difference in the number of muscle fibres stimulated by the two methods of experimentation, and the possible difference in the strength of the stimulant employed in the two cases, may have had on the average intervals; one can only conclude that the difference in the length and nature of the paths travelled in the two cases is somewhat more than is represented by 0.007 second.

What are the paths which the stimulus would have to pass over when the two methods of stimulation under consideration are employed? In the case of electric stimulation the electricity would only have to pass from the wet electrode, through the moist skin, the subcutaneous tissue, and the fascia to reach the muscle. In the case of a blow on the ligamentum patellæ, if the muscle fibres were stimulated mechanically, the jerk and the vibrations of the ligament would have to be transmitted along the chain of ligament, patella, quadriceps tendon, and quadriceps muscle. If the muscle were stimulated reflexly, the stimulus would have to pass, in addition to the above, through the afferent nerves to the spinal cord, through the reflex mechanisms in the cord, and through the efferent nerves to the muscle. There can be little doubt by which path the stimulus would soonest reach the muscle. The muscle would be stimulated soonest by electricity, almost as soon by the mechanical stimulation of a sudden jerk transmitted to it from the tendon, and some time later by reflex stimulation.

The difference between the periods of time required for the stimulus to pass from the point to which the stimulant was applied, to the muscle, in the experiments of Series I. and II , is, as has been stated, somewhat more than 0.007 second. Were the stimulation reflex in character, we should expect a very marked difference. The reflex time for such a process as the "knee-kick" has been supposed to be, cannot be calculated, because the rapidity of different reflex processes probably varies greatly; we may, however, obtain a rough idea of its length. It is the sum of the following periods, viz. :

1. The time required for the transmission of jerk and vibration, resulting from the blow, from the ligament to the sensory nerve ends in the tendon or muscle, and the time spent by them in awakening to activity. This period cannot be determined.

2. The time required for the transmission of the stimulus through the afferent nerves to the cord, and from the cord through the efferent nerves to the muscles. At the quickest estimated rate of transmission of nerve force, 90 metres a second, 0.016 second would be required for the passage of the impulse through a metre and a half of nerve length. Exner, in his calculations, uses the rate of 62 metres a second; at this rate 0.024 second would be required. By the more usual estimate, of 30 metres a second, nearly 0.050 second would be required for the transmission of the impulse to and from the cord.

3. The time occupied by reflex processes within the cord is probably very variable. Exner found it, in his determinations on winking, to equal 0.055 second.

4. The latent period of the muscle.

It is not worth while to add these periods together, for the result would give no accurate idea of the reflex time. The only use of referring to them is to show that, so far as we can judge from present knowledge, even rapid reflex processes require considerable time. Here it is interesting to compare the average intervals got by the experiments of Series I. and II. with the average interval of experiments of Series III., in which the stimulus was a reflex impulse called out by a vigorous electric irritation of the skin near the knee. The average interval of the experiments in Series I. is 0.064 second, that of the experiments in Series II. is 0.071 second, and that of the experiments in Series III. is 0.253 second—i. e., the average interval of the experiments in which the muscle was stimulated by a reflex impulse from the skin near the knee is three or four times as long as that of the experiments in which the muscle was stimulated by electricity, or by a blow on the ligamentum patellæ. The fact that a portion of the reflex interval was occupied by a summation of the impulses produced by the induction shocks, makes little difference, for, as the current was quite strong, and the hammer of the induction apparatus was vibrating very rapidly, the summation would have occupied but little time.

It may well be said that a reflex process, such as the "tendon reflex" is supposed to be, might be very much shorter than that of a skin reflex from the knee. This is true, but that it might be so much shorter as to require but little more time than the direct electric stimulation of the quadriceps is not at all evident. On the other hand, the difference found between the average intervals of experiments in Series I. and II. is about what one would expect to find were the muscular fibres of the quadriceps stimulated mechanically by the jerk and vibrations which would result from the blow on the ligamentum patellæ.

There is one more point to which it is necessary to refer. Not only do the experiments in Series II. have intervals closely resembling those of the experiments in Series I., but a larger percentage of the experiments

of Series II. have very short intervals than of the experiments in Series I. Thus, 12.3 per cent. of the experiments in Series II. had intervals ranging from 0.040–0.050 second, while only 3.2 per cent. of the experiments of Series I. had intervals as short. These very short intervals of Series II. are hard to reconcile with the idea that the stimulus had to pass through the cord before it reached the quadriceps muscle, but they might well have occurred had a vigorous blow on the ligament thrown all the muscle fibres into vibration.

The results of my experiments do not settle the question in dispute, but they add weight to the opinion already expressed by many competent observers, that the "knee-kick" is not a reflex act. Moreover, the mechanical conditions on which the "knee phenomenon" depends, the fact that muscle fibres are stimulated if they are suddenly twitched, and that the fibres of the quadriceps are in a position to be thus stimulated, and the time found to elapse between the blow on the ligamentum patellæ and the contraction of the quadriceps, all go to suggest that the phenomenon is entirely peripheral.

Although, as a rule, the contraction of the quadriceps which follows a blow on the ligamentum patellæ is a simple act, there was one set of experiments, among those recorded, which seemed to be an exception. Many of the curves got from one man, and on one day, showed an irregularity such as one might expect, if, when the original contraction of the muscle had reached its highest point, or when the muscle had even begun to relax, a second impulse had reached it, and caused it to contract still further. What was most interesting in this change in the form of the curve was that it occurred at an interval after the blow which closely corresponded to the interval got when the muscle was stimulated by a reflex stimulus coming from the skin near the knee. It suggested, of course, that the muscle received two impulses, as a result of the blow on the ligamentum patellæ, the one, a direct mechanical stimulation, the other, a reflex stimulus. The curve was never carried by the second oscillation to any marked height, however, and the chief part, as well as the first part of the "knee-kick," under normal conditions, at least, would seem not to be due to reflex stimulation. The rest of the curves obtained from the same man, on other days, and from the other men experimented upon, were searched in vain for any wave which might suggest the action of two separate impulses. The fact that such an oscillation of the curve was noticed is the more interesting because I have heard that de Watteville claims that the "knee-kick" is always a compound act.

As the results here given are of importance, and are liable to be questioned, it seems desirable that a more detailed account of the experiments and of the methods pursued should be given. I therefore state them here for those readers who are more especially interested in this subject.

Requirements of the Research.

The experiments must be made on man.

The subject must be placed at rest, in an absolutely comfortable position, in order that there shall be no disturbing movements or unwished-for reinforcements.[1]

The thigh must be steadied by a form of support, which, while it prevents movement being caused by the jar of the blow, when the ligamentum patellæ is struck, does not press on the quadriceps muscle, or on the large vessels or nerves.

The leg must be entirely free to move in response to the contraction of the quadriceps, and the weight of the leg and foot must be as far as possible gotten rid of, in order that the muscle may not be stretched, and the beginning of the contraction be lost. The contraction, rather than the swelling of the muscle, must be recorded, because it is the more marked event, and more likely to reveal the character of the action.

The recording apparatus must consist of a rapidly moving surface, and of three writing points: one attached to a tuning-fork to record the rate at which the surface is moving; another, connected with an electro-magnet, to mark the moment the irritation is given; and a third, to write the contraction of the muscle.

In accordance with these requirements, the following apparatus was put together.

Description of the Apparatus Used in the Experiments.

The man experimented upon lay on his left side on a comfortable couch, so formed as to support the head and back. The right thigh rested on a prop of plaster, shaped so as to conform to the inner and posterior surface of the thigh, and of such a height as to hold the knee on a level with the hip-joint. The right foot was supported by a swing suspended by a cord from the ceiling.

The movement of the foot, in response to the contraction of the quadriceps, was recorded as follows: A strong inelastic thread, attached by one end to the swing on which the foot was fastened, was guided by two accurately working pulleys to the top of the recording needle. One of these pulleys was on a movable stand, having a heavy base, and its position could be changed to correspond to the position of the foot, and thus the direction and the tension of the thread could be regulated. The other pulley held a fixed position, and the thread passing over it suspended the writing mechanism. This mechanism was cross-shaped, and consisted of a vertical shaft bearing a horizontal needle, which was adjustable at any desired height on the shaft. The vertical shaft was suspended from the end of the thread beneath the second pulley, and

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[1] Mitchell, The Medical News, February 13 and 20, 1886.

was insured free vertical movement and freedom from lateral oscillations by passing through two smoothly bored holes in two thin strips of metal, which were supported about fifteen centimetres apart by an iron standard. One end of the horizontal needle terminated in a fine rounded point, and rested against the blackened drum of a Ludwig kymographion (Baltzer's manufacture). Constant contact with the drum was secured by a fine plumb line, which hung against the other end of the needle. Contraction of the quadriceps and extension of the knee caused the needle to rise, while relaxation of the muscle and flexion of the knee were recorded by a fall of the curve. It was desired to detect any irregularity in the contraction of the quadriceps, and, therefore, it was especially necessary to prevent the needle from being thrown by the sudden jerk of the kick beyond the height which corresponded to the absolute movement of the foot. A thin yielding band of rubber was therefore attached to the lower end of the vertical shaft and to the floor.

The kymographion ran with great regularity, but this was not relied upon, and the rate of rotation was measured during each experiment by a tuning-fork, which, by means of a light metal point attached to one of the arms, wrote its vibrations on the drum.

An electro-magnet recorded, by a light lever attached to its armature, the moment the blow was struck on the ligamentum patellæ, or the moment that the induction current was thrown into the quadriceps muscle or the skin. The pattern of the magnet resembles that of Pfeil, of Berlin (described by Tigerstedt, *Arch. für Phys.*, Supplement Band, 1885), and its latent period was a little less than 0.003 second.

The instruments used for irritating were as follows:

The blow on the ligamentum patellæ was given by a medium-sized steel hammer, one end of the head of which was tapered to a dull edge, about an inch long and covered with a rounded rubber cap, of the thickness of a lead pencil. In cases in which the "knee-kick" was well marked, the ordinary percussion hammer was sufficient. The electric circuit of the recording electro-magnet was closed when a strip of platinum foil on the rubber end of the hammer touched a piece of gold braid, which was fastened by a garter over the ligamentum patellæ.

The induction current was applied to the rectus muscle by two wet electrodes, placed on the skin over the middle third of the muscle and about six inches apart. When it was necessary to stimulate the cutaneous nerves, the induction current was applied by a wire brush and a platinum point about half an inch apart.

In the case of electrical stimulation, one key simultaneously closed two circuits; the one going through the muscle, or the skin, the other through the electro-magnet.

A Grove cell was used for the electro-magnet, and another for the Du Bois-Reymond induction coil.

The same magnet recorded the moment of stimulation, and the same apparatus wrote the beginning of the contraction of the quadriceps, whatever the means of stimulation employed—*i. e.*, whether the muscle was stimulated by a blow on the ligamentum patellæ, by the direct application of the induction current, or by the reflex impulse resulting from the irritation of the skin near the knee. Therefore, the latent period for the apparatus was the same in all the experiments, and any difference in time which was found, was due to variations occurring between the moment the stimulant was applied and the moment the stimulated muscle had contracted enough to move the foot; in other words, to differences in the length and nature of the paths which the stimulus had to travel, and in the activity of the muscular contraction.

To conclude—from the experiments recorded in this paper, it would seem that the contraction of the quadriceps muscle following a blow on the ligamentum patellæ comes much too soon to be the result of a reflex stimulation. It is probable that the stimulation is due to a sudden stretching of the muscle fibres, and that the stimulus has the same character as when the muscle receives a direct blow. Before this conclusion can be accepted, however, the undoubted influence of the spinal cord upon the production of the phenomena must be explained. The current explanation that the irritability of the muscle to finer mechanical stimuli is dependent on " muscle tonus," will not be altogether satisfactory until the existence of " muscle tonus " is proved.

It seems probable, that, in addition to the first impulse which comes to the quadriceps when the ligamentum patellæ is struck, occasionally a second impulse, of reflex nature, originating either in the nerve ends of the skin or of the tendon and muscle, may come to it and increase the height of the contraction. Under normal conditions, however, this would seem to play a very subordinate part.

BACTERIOLOGY.

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(THIRD PAPER.)

Relation of Bacteria to the Living Animal Body.

From this brief summary of the relation of the bacteria to the soil in which they grow some idea will be obtained of the very important place which they occupy in the economy of nature. Without these

lowly organisms the highly organized animal and vegetable tissues would remain without undergoing decomposition, and, not being assimilable by plants, a large and constantly increasing amount of food for plants and consequently for animals would thus be withdrawn from circulation, with the result that ultimately vegetable animal life must cease for want of food. Such a catastrophe is provided against by the action of these minute plants. They can, as we have seen, assimilate these highly organized substances, converting part of them into their own proto-plasm, but breaking up the greater part into lower compounds, and the successive action of different species gradually reduces them to the sim-plest forms—carbonic acid, water, ammonia, nitrites, and nitrates—which are easily assimilable by the higher plants and go to build up again compounds suitable as food for animals. Less important than this com-plete reduction of organic substances, but still of great value, are the partial decompositions of the class of fermentations. For by means of these fermentative processes substances are produced which are of great use as articles of food and in the arts. But these are not the only in-fluences which the bacteria exert in nature. Another and more impor-tant point, from a medical point of view, is their relation to living animals. The researches of Panum and others, have established the fact that among the numerous products of the growth of bacteria are some which act as poisons on animals and vegetables, and Brieger has succeeded in several instances in isolating these poisons (which belong to the class of alkaloid substances) and in studying their chemical con-stitution, their origin, and their action on the living body. The exist-ence of poisonous products was also shown by Koch, in his work on *Wundinfectionskrankheiten*. He found that when a considerable quan-tity (five drops) of a putrid liquid was injected into mice the animals often died very quickly, symptoms of poisoning setting in immediately after the injection. The absence of bacteria from the blood and organs, the innocuous character of the blood (injections of blood from such an animal did not produce symptoms of poisoning), and the rapid onset of symptoms and speedy death showed that these animals had died from a chemical poison contained in the putrid material injected. These facts, obtained as the result of experiments on animals, correspond with and clear up several facts observed in man. It has been long observed that, after large operations, such as amputation at the hip-joint, a patient may apparently be doing well for a day or two, when suddenly serious symptoms set in, the patient becomes collapsed and dies in a few hours of what has been termed by some authors "secondary shock." In these cases it will be found that the discharges in the wound have undergone decomposition (putrefaction), and there can be no doubt from a considera-tion of all the facts, experimental and otherwise, that the patient has died from the absorption of the poisonous substances formed in these putre-

fying discharges. The simple fact that, where care is taken by antiseptic means to prevent the growth of bacteria in the discharges, these symptoms do not occur, proves this point. Cases of this kind are now grouped under the head of septic intoxication. This subject of septic intoxication will be referred to presently.

The production by bacteria of chemical poisons capable of destroying animal life naturally leads to the discussion of the relations which exist between bacteria and the living animal tissues and to the inquiry into the consequences of introducing bacteria into animals. The investigation of this matter brings out at once the fact that just as different species of bacteria act differently on the dead soil on which they grow, so different forms behave differently in relation to the living body, and, from this point of view, bacteria may be roughly divided into two classes: those which are able to live in the blood or tissues of living animals (parasitic bacteria) and those which are unable to grow under similar conditions (non-parasitic bacteria). Of known bacteria the great majority are non-parasitic on animals, at any rate on mammals.

The fate of non-parasitic bacteria when they gain admission to the blood and tissues of living animals has been investigated by various authors. Traube and Gscheidlen came to the conclusion, as the result of their experiments, that the living blood and tissues have the power of destroying microörganisms. In some experiments on microörganisms in wounds treated aseptically,[1] I came to a similar conclusion with regard to healthy animals. Into the veins of medium-sized rabbits, varying quantities of a putrefying infusion containing bacteria were injected. The animals were killed after twenty-four hours and their organs, or portions of them, introduced with suitable precautions into vessels containing cultivating infusions. These vessels were placed at the temperature of the body and watched for the development of bacteria. If from one-fourth to three-fourths of a cubic centimetre were injected, as a rule, no organisms developed. But if one cubic centimetre or more was used, bacteria were found alive after twenty-four hours. I explained this by supposing that in the latter instance a sufficient quantity of the poisonous products of the bacteria had been injected along with the organisms to depress the vitality of the animal and thus reduce the activity of the destructive process, for I found in another series of experiments that if the animal was in a bad state of health this rapid destruction of bacteria in the body did not occur. More recent researches have shown the probability of this view. I did not at the time attempt to show where the bacteria were destroyed or how they

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[1] Antiseptic Surgery, Its Principles, Practice, History, and Results, p. 252.

were got rid of, but in a subsequent research[1] I came across facts which seemed to suggest that the kidney is an active agent in the excretion and destruction of certain bacteria. After injecting a special kind of micrococci into the veins of rabbits, I found that they were present after death in masses in the kidney tubules, although I could nowhere detect any rupture of vessels in the glomeruli or elsewhere, nor any plugs in the bloodvessels. That, however, this view does not hold good for many other kinds of bacteria will be seen from the research to which I must now allude.

Wyssokowitsch,[2] under the direction of Prof. Flügge, has gone into this matter very fully. His method was to mix a pure cultivation of the bacteria to be tested with sterilized distilled water, and then by means of further dilution and plate cultivation, to estimate the numbers present in a cubic centimetre of the original mixture. As a rule, the fluids injected contained 20 to 40 million bacteria per cubic centimetre. A definite quantity of these fluids was injected into the aural veins of animals (chiefly rabbits), and at various intervals of time specimens of blood were taken with precautions against contamination and examined for microörganisms by means of the microscope and by cultivations, or the animals were killed and portions of their internal organs were examined in a similar manner. A large variety of bacteria were tested in this way.

Wyssokowitsch found that very soon after injection there was a partial or complete disappearance of microörganisms from the blood. The saprophytic or non-parasitic bacteria disappear most quickly, none being present in the circulating blood after three hours at most, even though enormous numbers were injected. And even if the bacteria employed are pathogenic for the animals experimented on, as, for instance, anthrax for rabbits, they diminish in numbers very rapidly, and may even for a time apparently completely disappear, especially if the numbers introduced be comparatively few; after a variable time, however, they reappear and gradually increase in numbers till death occurs.

The next question which Wyssokowitsch studied was, What becomes of the bacteria? Are they excreted by any organ, or are they destroyed in the blood? He has been unable to find any evidence of excretion of living bacteria. He tested urine, milk, and intestinal juice without finding the bacteria in them, unless some lesion of the walls of the vessels, as in the glomeruli, had occurred, allowing hemorrhage to take place. As to their destruction in the blood, he observed constantly an increase in the number of white corpuscles after the injection, but

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[1] On Micrococci in relation to Wounds, Abscesses, and Septic Processes. British Medical Journal, September and October, 1884.

[2] Ueber die Shicksale der ins Blut injicirten Mikroörganismen im Körper der Warmblüter. Zeitschrift für Hygiene, Bd. I. Heft 1.

this was apparently insufficient to account for the phenomena. He, therefore, had to ascertain whether the rapid disappearance of the bacteria from the blood was to be accounted for on the supposition that they are deposited in certain organs, as occurs in the case of pigment. To test this, he killed the animals at various intervals of time, and made cultivations from portions of various organs, as well as from the blood, and he found that this was actually what took place, the bacteria, like the pigment granules, being deposited in the liver, spleen, and medulla of bone. This is best seen in the case of non-pathogenic bacteria; when the bacteria are pathogenic to the animal employed they are not limited so markedly to these organs. The non-parasitic bacteria deposited in this way soon die if they do not contain spores. Hay bacilli are all dead in twenty-four hours; lactic acid bacilli die more quickly, very few being found after seven hours. Micrococcus tetragenus, which is not pathogenic in rabbits, does not die quite so rapidly, a few being present even after twenty-four hours. Bacteria live longer when very large quantities are introduced, and Wyssokowitsch adopts the same view in explanation of this which I had formerly suggested, viz., that the large quantity of the products introduced along with the organisms diminishes the vital and destructive activity of the body. If spores are injected, they live very much longer: the spores of penicillium were found alive after seven days; those of bacillus subtilis were found after twelve or sixteen days in large numbers, and in one case some were still alive even after three months.

Lastly, as to the histological elements which are especially concerned, Wyssokowitsch found the various organisms chiefly in the endothelial cells lining the capillary walls. In the spleen they were present in the large endothelial cells in the spleen pulp, and in the kidney they were only exceptionally found, and then in the cells of the interstitial tissue. The spores were also seen in the endothelial cells.

When bacteria are injected into the tissues, there follows a struggle for existence between them and the cellular elements. Leucocytes quickly accumulate in the neighborhood of the mass of bacteria, and then there follows a fight for the mastery between these cells and the bacteria. The cells take up the bacteria into their interior, and where the bacteria are non-pathogenic for the animal employed, they are destroyed and gradually removed by the cells. Where, however, the bacteria are virulent, the cells may undergo degeneration, and the bacteria continue to multiply in the tissues. Metschnikoff has studied the relation of the cells to pathogenic bacteria in daphnis and in the frog. Daphnis is frequently affected with microörganisms. These can be seen under the microscope in the circulating fluid, and the whole process can be studied. To the cells which feed or attempt to feed on the microörganisms, Metschnikoff gives the name of *Phagocytes*. The recovery or death of

the animal depends on whether the cells or the microbes are the victors in this struggle. Frogs kept under healthy conditions do not die of anthrax; if anthrax bacilli are introduced into the lymph-sac, they are quickly seized on by leucocytes and destroyed. If, however, the temperature of the animal be raised, thus favoring the growth of the bacilli, and at the same time lowering the vitality of the cells, the bacilli grow and penetrate into the circulating blood.

The parasitic bacteria differ very much in their seat and mode of action from one another. Some grow on the surface of wounds or on mucous surfaces, penetrating, as a rule, for only a short distance into the underlying tissues; such are the gonococcus, the diphtheritic bacillus, etc. Others grow by preference in the lymph channels (the micrococcus of erysipelas); some grow in the tissues, especially in the cellular elements (the leprosy bacillus, the tubercle bacillus, etc.); and others grow in the blood (anthrax, probably the organisms of the specific fevers, etc). And there are all sorts of transitions, the same organism growing at times only locally, at others in the bloodvessels. Again, some bacteria are specific on one species of animal and not on another; thus the bacillar septicæmia of mice does not, so far as we know, affect man; while, on the other hand, several infective diseases of man do not apparently affect the lower animals. By using the term "parasitic" in connection with these bacteria, it is not meant that they grow only in the living body. Some, it is true, apparently do so; for instance, the tubercle bacilli have not yet been met with outside the living body, and the conditions required for their growth are not such as are likely to occur in the outer world. Others, again, such as anthrax, live and flourish on dead animal and vegetable tissues, but when opportunity offers they can penetrate and flourish inside the living body.

The conditions necessary to enable these parasitic organisms to enter and live in the living body are manifold, and are as yet but imperfectly known. Some of them may, however, be indicated here. The point of entrance of the bacteria exercises a great influence on the result. The gonococcus, for instance, grows apparently only on the mucous membrane of the urethra, vagina, and eye; the occurrence of inflammation of other mucous membranes from infection with gonorrhœal discharge is very problematical. The cholera and typhoid organisms can apparently only act when they get into the small intestine. The idea that typhoid fever can be acquired by inhalation is extremely doubtful. In other cases the infection cannot occur through an unbroken surface; there must be some abrasion of the surface to which the infective material is applied. This is probably the case with syphilis, and possibly also with erysipelas. Other organisms, again, will only act if introduced into the subcutaneous or submucous cellular tissue, such as the bacillus of malignant œdema of guinea-pigs and mice. Again, in some of the

bacteria which are pathogenic in the lower animals, the infection is only accomplished by introducing the organisms directly into the blood stream. Although a full development of the disease is only obtained in many instances by the introduction of the virus into a particular part, a modified form of the disease is often produced by inoculation in other places. A good example of this is found in the case of symptomatic anthrax (*Charbon symptomatique, Rauschbrand*), investigated by MM. Arloing, Cornevin, and Thomas. In this disease the characteristic lesion is an irregular tumor in the subcutaneous cellular tissue, which spreads in every direction, soon crepitates, and in the majority of cases leads to a fatal issue. Here the proper seat of infection is the subcutaneous cellular tissue, and the injection of a considerable quantity of the juice from the tumor into loose cellular tissue is followed by the production of the typical disease. If, however, the injection is made into the tail, where there is very little loose connective tissue, and especially if only a small quantity be used, only a mild form of the disease is produced, and the same is the case when the injection is made into a large vein, care being taken that the material does not run into the cellular tissue. Where a mild form of the disease is thus produced, the animal is protected from a subsequent attack of the virulent disease. I have made out similar facts with regard to a bacillus first described by Hauser under the name of *Proteus vulgaris.* In my first experiments with this organism, I found that rabbits died after injection of a considerable quantity into the back. Carrying on the investigation still further, I got irregular results; some animals dying, others not. Further investigation of the matter revealed the fact that in the animals which died the injection had passed into the muscles of the back; while in those which lived it had only gone into the subcutaneous cellular tissue. The same result was obtained when the thigh was the seat of experiment. Injection of a given quantity into the muscles was followed by death; into the subcutaneous cellular tissue the result was not fatal. In the animals which died, a few bacilli were found in the blood of the heart; but there was no marked multiplication in the blood, as in the case of anthrax and other blood diseases. While the fatal result was obtained only where the injection was made into the muscles, abscesses resulted after injection into the cellular tissue, and these animals did not succumb after subsequent injection into the muscles, an abscess then being the only result. When this subject is studied more closely, other facts will no doubt be made out of a similar kind with regard to other diseases.

A very important point in regard to infection, and one on which stress has not been sufficiently laid, is the dose of the virus which comes into action. This is a matter which I have been lately investigating, and as the facts obtained are of great importance, I may briefly indicate my

results.[1] Among the questions to be considered, the following are the chief: Can a single pathogenic bacterium produce the disease, or must a number be introduced in the first instance? Is there any difference in the severity of the disease when the primary dose is large or small? At first sight, one would say that if the virus is self-multiplying, if it is a bacterium, for instance, it can make no difference to the ultimate result whether the initial dose was large or small; the only difference it could make would be in the length of the incubation period. In laboratory cultivation experiments one finds that a single bacterium planted in a suitable soil will grow and produce the characteristic changes in that soil with the same certainty as if a large number were introduced. But, as I shall immediately point out, this is not the case with all pathogenic bacteria in their action on the living body.

The results of my experiments, which, however, are not yet completed, and to which I shall, therefore, not refer in much detail, are briefly the following. In certain cases the introduction of a single bacterium into an animal is sufficient to set up the disease. Thus one anthrax bacillus injected subcutaneously will kill a guinea-pig as certainly as would 1000, though after a longer time. One bacillus of chicken cholera or rabbit septicæmia will kill a rabbit. One bacillus of mouse septicæmia will kill a mouse. This is the case where the animals are very susceptible to the disease, but if the bacteria are introduced into less susceptible animals the result is different. Thus chicken cholera does not naturally affect guinea-pigs, but if the bacilli are introduced in large numbers into the subcutaneous tissue the animal may die. I have not, however, been able to kill guinea-pigs with chicken cholera if less than 100,000 bacilli were introduced, unless, indeed, they were injected into the peritoneal or pleural cavity. Chauveau[2] found that the same held good in the case of anthrax and Algerian sheep; a minute dose did not kill. Staphylococcus pyogenes aureus and albus, and Sternberg's micrococcus (from cultures) do not kill rabbits if only a single organism be introduced, considerable numbers are necessary (in the case of the staphylococci, for instance, several millions) to cause death. But in all these cases, where large numbers are requisite in order to produce a fatal result, a smaller dose will produce a local effect in the form of inflammation, abscess, or necrosis of tissue. Here, also, there is a limit; in guinea-pigs, for instance, less than 10,000 chicken cholera bacteria produce no effect at all. But there is a further most important point in connection with this matter, viz., that in many cases the small dose which produces a local effect, at the same time protects the animal from the fatal result if a larger dose be subsequently introduced. Chauveau, for instance, found that while small doses of anthrax bacilli did

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[1] See paper by the author "On Certain Conditions of Infection," British Medical Journal, July, 1886.

[2] Comptes Rendus, 1880.

not kill Algerian sheep, they were able to render the animals immune from subsequent injection of large doses. In *charbon symptomatique* similar facts have been made out. The injection of a very small quantity of the virus into the subcutaneous cellular tissue produces, in many instances, only a slight local disturbance, and when this has passed off the animal is found to be protected from subsequent attacks of the disease. Hauser's bacillus (*Proteus vulgaris*) illustrates these points very well; in fact, this was the first organism with which I experimented in regard to the question of dose, and the results obtained with it led me to direct my attention to the local and protective results of small doses. A large dose (one-tenth cubic centimetre) of a cultivation of this organism in nutrient jelly injected into the muscles of rabbits causes the death of the animals within twenty-four hours. A small dose (one-fortieth cubic centimetre) of a similar culture is followed by suppuration and necrosis of the muscle, but not by death. A subsequent injection, a few days later, of a fatal dose into another muscle is not followed by a fatal result, but only by a local abscess. I may mention two laws which have resulted from my research, and which I think important as throwing light on the spread of epidemics; but for the discussion of the whole matter I must refer the reader to the paper previously mentioned. The two laws are, 1. The pathogenic dose of a virus varies inversely with the susceptibility of the animal to the disease; 2. In animals not very susceptible to the disease the pathogenic effects of a virus vary directly with the dose primarily introduced.

How far these facts are applicable to infectious diseases in man remains to be investigated, but the fact that such differences do exist as the result of the dose of many viruses, and the fact that the predisposition to the disease influences the effect of a given dose must be borne in mind in future in studying the question of infection in man. I may indicate one or two instances in which such a difference in result is likely. As the result of the introduction of the Bacillus anthracis, we know two effects in man: the formation of a malignant pustule, from which the patient may recover, and the general fatal blood disease. May not the difference in the result in these two cases depend, to some extent at least, on the primary dose? In an individual not predisposed to this disease, may it not be that a dose which, in another person, would produce the general fatal disease, causes in him only a local effect? Indeed, in man we have no evidence that in any case a single anthrax bacillus can cause a fatal result, as it does in the case of guinea-pigs. Cholera is a disease in which this matter of dose probably plays a very important part. From a consideration of the modes and spread of infection in this disease, it is in the highest degree possible that a single cholera bacillus would not produce any effect, that a few would be followed by only a slight diarrhœa, which might protect the patient, for a time at least, from a fatal

dose, and that only a comparatively large dose is followed by the typical disease. Here, again, of course, the question of predisposition would come into play, and a dose which, for one individual, would produce a fatal effect, would cause only a passing derangement in a less susceptible individual. Whether this holds good in relation to diphtheria, tuberculosis, and other diseases, is a matter for investigation. It is possible that the local tuberculoses may be, to some extent at least, determined by a small dose in the first instance, but that is purely a speculation.

In the case of the pyogenic organisms, however, this matter of dose is probably of great importance. Ogston has supported the view that the difference between a slight suppuration or abscess and pyæmia is a difference of dose, and though formerly inclined to doubt this view, I must confess that it now seems to me to contain much truth. My experiments on rabbits with the staphylococcus showed that the matter of dose was a very important one, a large dose killing the animal, a medium dose causing an abscess, and a small dose remaining without effect. What adds the greatest probability to this view is that the organisms found in pyæmic abscesses, and which are evidently the cause of these, are the same as those found in local suppurations and abscesses, and it is difficult to see what other explanation can be given of this fact. At first I was inclined to the view either that the organisms found in pyæmia, though similar morphologically, were really different from those present in acute abscesses, or else that they were accidentally present, and that the true organisms of pyæmia had not yet been discovered; but the researches of Rosenbach, which have demonstrated that the organisms present in pyæmic abscesses are really the same as those of ordinary suppurations, and my own researches showing the actual existence of different effects as the result of different doses, have led me to believe that Ogston's views are probably to a considerable extent correct.

It is difficult to understand the meaning of the fact that in many cases a large number of bacteria are required to produce an effect, but the following seems to me to be a probable explanation: In the fight which occurs between bacteria and the tissues in the body, when the former are victorious it is probably in many cases due to the effect of the poisonous chemical products which they produce. When the animal is not particularly predisposed to the disease, the tissues are able to resist these products and to destroy the bacteria. Where, however, the bacteria are present in large numbers, such a large quantity of this poison is introduced as to weaken the cells, give the victory to the bacteria, and lead to the death of the animal. Where the number of bacteria is less, their victory is only partial, and a local affection is the result. That the chemical products have a good deal to do with the ability of bacteria to take root in a body is shown by the following experiment. I have stated with regard to Proteus vulgaris that while one-tenth cubic centimetre of

a gelatine cultivation injected into the muscles of the back of a rabbit caused the death of the animal, the use of one-fortieth cubic centimetre produced only an abscess. In order to inject one-fortieth cubic centimetre accurately I have generally added one cubic centimetre of the cultivation to three cubic centimetres of boiling distilled water, or of sterilized meat infusion, and then injected one-tenth cubic centimetre of the mixture. If, however, instead of using boiled distilled water for dilution I use a cultivation of these organisms in meat infusion, boiling the infusion before use in order to kill the bacteria, I have found that in most cases one-tenth cubic centimetre of this mixture causes the death of the animal. Here a larger quantity of the products than usual was introduced, and enabled the bacteria to cause the fatal result. It must not be supposed that these animals died solely of chemical poisoning, the examination of the blood and tissues showed clearly that death was due to the multiplication of the bacteria.

Among other conditions necessary for infection we have predisposition to the disease on the part of the patient. The predisposition to disease varies greatly in different individuals, and undoubtedly plays a very important part in the spread of infective diseases. It is difficult to define exactly what is implied by the term predisposition. It may mean some slight difference in the chemical constitution of the body, the excess of some element which is noxious to the development of the bacteria in question, or the deficiency of some substance which is necessary for their vigorous growth. It may, however, mean only a greater or less vitality and resisting power on the part of the cellular and tissue elements leading to more rapid and complete destruction (or the contrary) of the parasite. It is highly probable that the resisting power of the cellular elements at the time of attack plays a greater part than some supposed difference in chemical constitution of the body, and the facts previously mentioned in regard to the dose showing that the resistance of the animal may be overcome by increasing the dose of the virus, tends to support this view, for if the soil were chemically unsuitable for growth it is not easily conceivable that the introduction of a larger number of bacteria would render it more suitable. Predisposition is not only general but local. An individual may be in weak health and yet resist the disease if only the local part exposed to attack be healthy; while, on the other hand, a person may be in good health and yet be attacked by the disease if the point of entrance of the poison be in a weak state. It is generally supposed that something of this kind occurs in tubercular infection. In the case of tuberculosis of the lung it is assumed that in addition to inhalation of bacilli there must be some local catarrh or some interference with the circulation in the apex of the lung, rendering it more liable to attack than if it were in a healthy state. In several infective diseases the existence of a wound or some diseased condition of the part exposed

to attack is certainly necessary. In considering the question of pre-disposition we have to remember the well-known fact that immunity, at any rate of a temporary character, follows an attack of many diseases. What it is that occurs to prevent the same bacteria from taking root a second time in the same body, is quite unknown, but here also the prob-ability is that in some way or other the tissues of the body have become endowed with special powers of destroying these organisms. This is a more probable view than that which assumes that something has been added to or taken away from the body, rendering it an unsuitable soil. Whatever it may mean, protection may be brought about in various ways. A severe attack of the disease may leave the body protected; a mild attack may do the same, the mildness of the attack depending agian on the seat of infection, on the dose of the virus, etc. Or, again it may be brought about by the introduction of a virus of less virulence than that which ordinarily causes the disease.

This last fact leads us to the question of the attenuation of virus and protective vaccination. Toussaint and Pasteur were the first to prove that the virulence of bacteria varied according to the conditions under which they were placed. Pasteur found that by keeping cultivations of the microbe of fowl cholera in chicken infusion for some time the organisms gradually lost their virulence, till after some months they were no longer able to give rise to the disease, but in the intermediate stages they were of various degrees of virulence, decreasing as the cultivations became older. Fowls inoculated with cultivations some three months old became ill, as a rule, but recovered and after recovery they were found to be protected against the virulent disease. Pasteur came to the conclusion that it was the prolonged exposure to oxygen which led to the diminution of the virulence, and showed that where flasks were filled about three-fourths full of liquid, inoculated with the microbe, and then sealed with a blowpipe, growth occurred slowly and even after nine months the bacteria still retained their full virulence. The bacillus of anthrax has also been attenuated and animals protected with it in various ways. Pasteur attenuates it by cultivating it in flasks containing a thin layer of fluid at a temperature of 42° to 43° C. After about six weeks the organisms, though still alive, do not kill any animals. When somewhat less old they kill only mice, still earlier (before the tenth or twelfth day, according to the temperature) they kill mice and guinea-pigs, but not rabbits. Koch finds that the attenuation here probably depends more on the temperature than on the oxygen. Toussaint, who was the first to attenuate the Bacillus anthracis, did so by heating the defibrinated blood of an animal which had died of anthrax to a temperature of 55° C., and keeping it at that temperature for ten minutes. This method is very uncertain; in some cases the bacillus is really attenuated and may serve as a vaccine; in others, it retains its virulence and kills sheep; in

others, again, it is killed. Chauveau has also published facts which show the great effect of heat in attenuating the bacillus.[1] He inoculated sterilized meat infusion from the blood of an animal which had died of anthrax and kept it at a temperature of 42° to 43° C. for twenty hours. He then removed it to a second incubator heated to 47° C. According to the length of time during which the cultivations were kept at the latter temperature, the organisms varied in virulence. Before being placed at 47° C. they killed guinea-pigs within forty-eight hours, after being kept at 47° C. for one hour they still killed guinea-pigs, but after a longer time. If kept for two hours at that temperature, a considerable number of the animals recovered. After three hours no fatal effect was produced.

Pasteur's theory of the attenuation of the Bacillus anthracis was that at 42° C. spores were not formed, and that, therefore, the oxygen was able to act on the adult organisms and cause their loss of virulence. Apart from the fact that spores are formed at this temperature other experiments, and especially those of Chauveau, show that the oxygen is not the cause of the attenuation. Chauveau found that in vessels from which the air had been removed by means of the air-pump attenuation occurred more rapidly at 47° C. than when oxygen was present. Attenuation can also be effected by the addition of chemical substances to the cultivations. Thus, the addition of $\frac{1}{600}$th part of carbolic acid to an infusion does not, according to Chamberland and Roux, prevent the growth of the bacilli, but, nevertheless, the bacilli gradually lose their virulence so that after twenty-nine days they do not kill either rabbits or guinea-pigs, and vaccines of intermediate strength are obtained at an earlier period. The addition of $\frac{1}{2000}$th to $\frac{1}{5000}$th part of bichromate of potassium produces similar results. The authors further state that the diminished virulence thus obtained is retained in subsequent cultivations in materials not containing these antiseptic substances, just as appears to be the case with cultures attenuated gradually at 42° to 43° C., while in Toussaint's and Chauveau's methods the full virulence of the organism is subsequently regained on cultivation in fresh materials at the ordinary temperature.

How far the results are applicable practically is a matter of dispute. Pasteur holds that they are, and he has already inoculated large numbers of sheep and cattle. He recommends the use in the first instance of a very weak vaccine, and subsequent inoculation ten days later with a stronger. Koch states that the first vaccine should kill mice but not guinea-pigs and rabbits, while the second should kill mice and guinea-pigs but not rabbits. Koch also holds that the losses after vaccination sufficient to insure complete protection of sheep will be greater than

[1] Comptes Rendus, tome 96.

from the natural disease. Pasteur says that such strong vaccines need not be used, because he thinks that the natural infection is less virulent than the artificial one. Koch asserts the opposite, on the ground of experiment. He fed sheep which had previously been vaccinated with large quantities of spores, and two out of seven of them succumbed to anthrax, although all seven had previously withstood a control inoculation with very virulent materials. On these grounds Koch declares against the introduction of protective vaccination of sheep for anthrax. In this matter I venture to differ from Koch, and am inclined rather to agree with Pasteur as to the utility of his protective vaccinations. His statistics, which seem satisfactory, show a great diminution in the number of deaths from natural anthrax after protective vaccination on farms previously much ravaged by the disease, while apparently there has not been much loss as the result of the vaccinations. It may be quite correct, as Koch says, that infection from the intestinal tract is in reality more virulent than the artificial, and yet, nevertheless, the animals may be sufficiently protected to resist it. I look on an inoculated animal, even though not absolutely protected, as an animal less predisposed to take the disease than an uninoculated one. As we have seen before, less susceptible animals require a larger dose of a virus than those which are more susceptible. Hence these inoculated animals would require a larger dose of the virus to kill them than the uninoculated, and, therefore, the question is: Is it likely that in natural infection animals usually receive a large dose? I think this is most probably not the case, and that they are in most cases sufficiently protected to be able to resist the small dose they would usually take in, and which, without this partial protection, would prove fatal. In Koch's experiments he administered large doses of spores to his vaccinated sheep. I should doubt if it is often the case that animals when grazing would take in anything like the same amount at one time. Of course, I admit that this is pure speculation, but it is a point that could be easily tested, though, unfortunately, I have not the opportunity of doing so. Pasteur's statistics are very striking, and deserve attention, while Koch has definitely shown that these animals are not necessarily absolutely protected. Hence, an explanation must exist for Pasteur's success, and the one I have attempted to give seems to me very probable. Among other objections urged against protective vaccination it is said that it would increase the disease by spreading the organisms, but this is a very shadowy objection and one which ought to be easily overcome in practice. It is interesting to note that the attenuated organisms do not, according to the most trustworthy researches, regain their virulence on further cultivations.

The degree of virulence of a pathogenic organism may also be altered in other ways. In the course of Pasteur's interesting researches on

swine plague he found that pigeons inoculated with the virus of swine plague died in six to eight days after suffering in the first instance from symptoms like those of fowl cholera. If the disease is transmitted from pigeon to pigeon, the organism after a time acts more violently, and the animal dies sooner. If, now, pigs are inoculated from these pigeons, death occurs more quickly than when inoculated from a pig, the organism having become more virulent. With the rabbit the converse is the case. The virus kills rabbits, but if it is passed through a series of rabbits it is no longer able to kill pigs. Although, however, it does not kill the pigs, these animals are rendered immune by inoculation from rabbits against the virulent disease. Pasteur has also made out similar facts with regard to rabies. If the poison of rabies is passed through a series of rabbits it becomes more virulent. If, however, it is passed through monkeys it loses its virulence, and dogs inoculated from the affected monkeys are rendered refractory to rabies.

In order to attenuate the virus of rabies Pasteur now employs another method. Small portions of the spinal cord (a few centimetres long) from an affected rabbit are suspended in dry air in flasks. After a few days the virulence of the cord rapidly diminishes, till at last it is entirely destroyed. Animals may be protected from rabies by injecting portions of the cord which have been suspended in this atmosphere for various lengths of time. Pasteur attributes this attenuation to the action of oxygen, because he does not find that it takes place if the vessel be filled with carbonic acid gas instead of air.

Besides these various conditions of infection, there are without doubt others which we do not as yet know. For example, we cannot explain satisfactorily why certain infective diseases at one time only appear in a sporadic form and at another as epidemics. Nor is the influence of season on the spread of epidemics an easy matter to understand. We must wait for further inquiry into the life history of these micropara-sites and their relation to the living body to throw more light on these subjects. But on the other hand, although we may not be able to understand all at once the exact *modus operandi* of any particular microörganism in the production of a disease, that is no reason why we should reject evidence which points to a relation between a bacterium and a disease, nor the conclusions which analogy would lead us to draw from such evidence.

Having now considered the conditions of infection, we must study a little more closely the relation of these parasites to the living body. I have already referred to the question of septic intoxication. By this term is meant the absorption of poisonous substances produced by bac-teria, these bacteria, however, being non pathogenic—*i. e.*, unable to live and grow in the tissues of the body. I have referred to one of the effects of septic intoxication, viz., the rapid death of the patient, but

this can only occur when the wound is extensive and where there is a large amount of fluid contained in it in which the bacteria can grow. When the quantity of poison absorbed is less than is required to produce a fatal result, febrile symptoms are caused, and continue either till absorption can no longer occur or till the growth of the particular organism ceases. This mild septic intoxication is the cause of the traumatic fever which follows operations. That this fever is due to bacterial development is shown by the fact that it is absent in cases treated aseptically, in which bacteria do not enter and grow in the wounds. This fever lasts for three or four days, and then subsides coincidently with the establishment of granulation and the consequent formation of a barrier to absorption. The particular organism or organisms which give rise to this poison are not definitely known. Hauser thinks that the bacteria described by him under the name of Proteus, more especially the Proteus vulgaris, which are often present in putrefying discharges and gangrenous tissues, and which give rise to a substance which is very poisonous to certain of the lower animals, are the common agents. It is possible, however, that it is not always the same bacterium nor the same poison which is at work.

It is not, however, only from wounds in the skin that septic intoxication occurs; the same, no doubt, takes place from the uterus after delivery, constituting one form of puerperal septicæmia; and it is also probable that from the intestine poisonous substances produced by non-pathogenic bacteria may be absorbed and give rise to illness, diarrhœa, and, it may be, death. In fact, cholera is a disease closely allied in its pathology to septic intoxication, although the cholera bacillus must be classed among the parasitic organisms. The generally accepted pathology of cholera is that the intestinal canal is the seat of the virus, which grows there and produces a poison, on the absorption of which into the circulation all the other symptoms depend. But few competent observers doubt now that the cholera bacillus discovered by Koch is in reality the virus of the disease. The evidence in favor of the bacterial origin of this disease is very strong, and no other organism has been found to which, by any possibility, could be assigned the *rôle* of cause, while the facts in favor of the cholera bacillus as the real agent are very striking. The probable course of events is that this bacillus grows in the contents of the small intestine and produces an intense poison, which being absorbed, and perhaps also acting locally, sets up the various symptoms. After a time apparently the bacillus may penetrate for a short distance into the coats of the intestine, especially toward the lower end of the ilium, but this phenomenon is in all probability purely secondary and of little influence on the course of the disease, the poisonous material being in reality produced in the contents of the intestine and not in its walls. The objection which has been urged against this view is that absorption

could not occur from the intestine during the stage of diarrhœa. This, however, is merely an assertion not founded on any evidence, and there seems no good reason why absorption might not go on by the lymphatics and lacteals at the same time that fluid was being poured out by the bloodvessels. Indeed, there seems every reason to believe that remedies such as opium are absorbed not only from the stomach, but from the intestine during the acute stage of the disease. And even though absorption at this stage was difficult or impossible, the probability is that the main quantity of the poison which comes into play is absorbed before the most acute stage is reached, and that the loss of large quantities of the fluid part of the blood plays a great part in the subsequent phenomena. This disease probably stands on the border-line between true septic intoxication and the typical parasitic disease.

In many of these parasitic diseases the bacteria grow only locally, and from the local centre exert their influence on the body. It is difficult to see in what way the general disturbance can be caused, except by supposing a local production of poisonous substances which are carried into the circulation, and thence exert their deleterious influence. A striking example of what I believe to be a purely local disease in the first instance is diphtheria. What the exact relation of microörganisms to diphtheria is has not yet been satisfactorily made out; but, according to Löffler's researches, it seems most probable that diphtheria proper (as distinguished from diphtheritic sore throat occurring in connection with other diseases) is due to a bacillus. In diphtheria of the throat this organism grows in the superficial layers of the mucous membrane, and rapidly spreads along the surface. As the result of its growth, a large amount of fibrinous exudation is poured out, and the cells of the mucous membrane in the affected areas die. The constitutional disturbance seems to be due entirely, at any rate in the first instance, to absorption of chemical products from the local growth, and not to the entrance of the living virus into the blood. Löffler did not find these organisms in the bloodvessels or in internal organs, except in one or two instances, where they were present in the alveoli of the lungs and in the liver, and in these cases Löffler ascribes their presence to post-mortem changes.[1] It must be admitted that this view of the pathology of diph-

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[1] This pathology of diphtheria is opposed to the teaching of many, that diphtheria is a general blood disease with a local eruption, and accordingly, if correct, various important changes must be made in the treatment of this affection. Holding that diphtheria is, in the first instance at least, a purely local disease, I have used in several cases energetic local treatment with considerable success, the treatment being based on an attempt to destroy these organisms and prevent their spread. In order to accomplish this, it is necessary to remove all false membrane as thoroughly as possible by means of forceps, etc. I then paint the surface of the throat, especially the part affected, with a 1 to 500 watery solution of corrosive sublimate, repeating the application every hour, care being taken that this solution does not run down into the stomach and set up intestinal irritation. The patient has at hand a gargle of 1 to 2000 sublimate solution, with which he washes out his throat frequently; and I have also sprayed the throat from time to time with a 1 to 40 carbolic acid solution. The result of this treatment supports the local pathology of diphtheria, for I have seen an extensive sthenic affection of the throat treated in

theria leaves the after-paralysis unexplained; but, on the theory that this is a general disease with a local manifestation, this phenomenon is equally difficult to understand. The idea that it is due to spread of bacteria along the nerves, or to a neuritis, does not seem to be satisfactory.

This view of the absorption of a poison from a local source, giving rise to general constitutional symptoms, apparently holds good in a number of local infective diseases, both acute and chronic. In erysipelas the micrococci which have been shown to be the cause of the disease seem to spread only in the lymphatic vessels of the skin, and have not as yet been found in the blood, although in this disease there are very marked constitutional symptoms. In most cases of septicæmia, also, the micrococci seem to be limited to the neighborhood of the wound, and are not found in any quantity in the blood. The term septicæmia, however, probably includes a number of distinct diseases, in some of which the microörganisms grow locally only, in others multiply in the blood, as in the corresponding disease in rabbits, mice, etc. In other local affections, such as phthisis, the fever and the general symptoms which accompany them are also probably due, in part at least, to absorption of noxious substances from the local disease.

In typhoid fever we have a transition between purely local diseases and general or blood diseases. In typhoid fever we have apparently in the first instance a purely local affection, the infection probably commencing from the intestine. The bacilli, in the first instance, seem to penetrate into and grow in the lymphoid follicles of the small intestine, leading to swelling, and ultimately to ulceration of Peyer's patches and the solitary glands. After a time the bacilli, carried along by the

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this way, in which the temperature fell very quickly after the treatment was commenced. This would hardly have been the case were diphtheria a constitutional disease.

These views ought, I believe, also to influence the question of tracheotomy in diphtheria. The general rule as to performing tracheotomy is to wait till there are definite signs of obstruction of respiration, the only object of the operation being to permit the free entrance of air. This view I hold to be entirely erroneous, and I believe that much might be done by performing tracheotomy early, in the way of preventing the spread of false membrane downward into the lung. I would suggest the opening of the trachea as soon as it is certain that the larynx is affected, and this opening should not be made merely with the view of inserting a tube, but with the view of applying medicaments to the trachea and larynx in the same way as I have indicated in the case of the pharynx. Hence a large opening should be made to enable the operator to see into the trachea easily. If the trachea is healthy, the membrane not having reached it, it seems advisable to attempt, by means of a brush, to apply the strong sublimate solution to the larynx through the vocal cords, and then to pack the upper part of the exposed trachea with gauze dipped in a 1 to 2000 or 1 to 3000 sublimate solution, leaving sufficient space at the lower part for the insertion of a tube. This plug could be removed every two or three hours, with the view of seeing whether the disease was spreading downward. It seems unlikely that it would spread under this solution; but if it were found to do so, the membrane could be scraped off, and the surface touched with the strong solution. This looks at first sight a severe measure, but in reality it would, I believe, be free from danger; and, considering the great risk to the patient when once the membrane begins to spread along the air passages, it is, I think, worth trying. Unfortunately, diphtheria is reckoned as a medical disease, and the surgeon is rarely called in till the time has passed for such treatment. Hence I merely throw out the above method as a suggestion; for, although experience would probably show that the details require modification, the principle seems to me to be sound.

lymphatics to the mesenteric glands, seem to penetrate into the blood, and are found in the great majority of cases in the form of plugs in the bloodvessels in various organs, more especially in the liver, spleen, and kidneys. At what period of the disease the organisms reach the blood, whether they always do so, and what are the exact relations which exist between the local and the general disease, are not known.

Of general diseases in men—i. e., where the bacteria inhabit the blood—but little is known. It is probable that the various specific fevers are due to bacteria, but, although in some instances micrococci have been found, there is no certainty that these organisms are the cause of the disease. Anthrax in man, occurring under the name of woolsorter's disease, is frequently a general disease, though many cases occur in which it is, in the first instance at least, purely local. In man, also, relapsing fever has been shown to be connected with the development of a spirillum in the blood. In pyæmia and ulcerative endocarditis micrococci grow in the blood, but they are very soon deposited in the capillaries in various organs as emboli, and these conditions are hardly comparable with general bacterial blood diseases like anthrax. In the lower animals a number of general diseases are known in which the bacteria grow in the blood and cause the death of the animal; such are the bacillar septicæmia of mice, chicken cholera, rabbit septicæmia, the septicæmia of mice and rabbits caused by Sternberg's micrococcus, etc. Death may be brought about in this instance in various ways; just as in the case of the local affections a poison may be developed as the result of the growth of the bacteria in the blood which set up the symptoms; or the bacteria, living in the blood, may remove materials from it, among others oxygen, which are necessary for the life of the animal; or, again, the enormous numbers of bacteria present in the blood, and especially in the capillaries, may set up serious circulatory disturbances, which may, at the least, aggravate the general symptoms. The cases in which the blood simply serves as the vehicle for the dissemination of a disease, as in acute tuberculosis, must not be confounded with the above.

The local effects of bacteria are very various, and differ in the case of almost every bacterium. They may also, in most cases, be explained by supposing a local action of a poison originating as the result of this growth of the bacteria. The poison, however, is evidently not the same in all cases—indeed, it is probably different in every instance. The most violent of the local effects of bacteria are seen in various gangrenous affections (acute traumatic gangrene and noma). Here it is not a case of death of the tissues as the result of violent inflammation, so much as a direct killing of them by the products of the bacteria. In acute spreading gangrene bacilli have been found which are apparently the cause of the disease. In noma long bacilli are present, which Mr. Lingard has demonstrated to be the cause of the disease. In gangrenous

stomatitis in the calf, which affects calves at particular seasons, he has found bacilli which are very similar in appearance to those present in noma in man. On cultivation they present characters which render them easily distinguishable from other bacteria, and on inoculation of these organisms into the calf a gangrenous stomatitis is again produced. A somewhat similar affection, though less violent, was studied by Koch in connection with mice, in which a progressive gangrene of the tissues was caused by the growth of a streptococcus in them.

Another set of local phenomena caused by bacteria are inflammatory, and in connection with these, micrococci of various kinds are generally present. In inflammation in man two kinds of micrococci are chiefly found : streptococci, where the individual cocci are arranged in chains, and staphylococci, where they are arranged in groups. Of the latter there are several kinds. The streptococci are generally found in connection with violent phlegmonous inflammation, where there is a tendency to necrosis of tissue with but little suppuration ; the staphylococci are chiefly found in abscesses. The conditions under which abscesses arise in connection with these organisms are not very clear ; I believe that local injury or weakening of the part is necessary in most cases, and that the primary dose is of great importance. That these organisms act by the production of poisonous or irritating materials seems certain, for if injected into the blood-stream in animals (and in man in pyæmia and ulcerative endocarditis) they give rise to emboli in various organs, and in stained preparations of these organs it is seen that the tissues in the immediate vicinity of the embolus do not stain, they are dead (coagulation-necrosis), while, at some distance off, a ring of leucocytes is formed which encloses the organisms. It is clear that the tissue in the immediate vicinity of the mass has been killed by some poisonous excretion, which, at a further distance, has been more dilute, and has only acted as an irritant. In connection with the pyogenic micrococci, it is interesting to observe that the same organisms are found in pyæmia, more especially the streptococci. Probably the difference in dose plays an important part in the different action of these micrococci, nevertheless I cannot but think that some other conditions, with which we are as yet unacquainted, must come into play.

A third set of phenomena may be observed as the result of the local action of bacteria, viz., formative and degenerative processes. In tubercle we have something more than a merely inflammatory process ; we have a distinct formation and transformation of cells as indicated by the appearance of large numbers of epithelial cells, and also of giant cells at an early stage of the process. The tubercle bacillus seems at first to grow by preference (where it can) in epithelial (as in the alveoli of the lung) or endothelial cells, leading, in the first instance, to their hypertrophy and multiplication, but, bye and bye, to their degeneration and

caseous transformation. In the case of some cells, however, the vitality of the cell seems to be unusually great, and thus they go on growing, leading to the formation of a giant cell. A tubercle illustrates very well the fight between cells and bacilli. If the cells are the weaker they quickly die and undergo degeneration, and thus the centre of the tubercle becomes converted into a caseous mass, in which the bacilli may, for a short time, continue to grow. If, however, the cells obtain the victory, the bacilli soon disappear, and a "fibrous tubercle," containing giant cells, is left, in which few or no bacilli can be found. These are the tubercles which, on account of the absence or small number of the bacilli, have led to the formation of various theories as to tubercle being due to a chemical poison, etc. These theories, however, depend, I believe, on misinterpretation of the facts; such tubercles are rather to be regarded as tubercles in which the bacilli have been already destroyed than as growing nodules. Other examples of the formative action of bacteria are seen also in syphilitic affections and in leprosy.

THE SURGERY OF THE PANCREAS,
AS BASED UPON EXPERIMENTS AND CLINICAL RESEARCHES.[1]

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CYSTS OF THE PANCREAS.

FOR a general consideration of this part of our subject I refer to my paper on "The Surgical Treatment of Cysts of the Pancreas," in the number of this journal for July, 1885. I allude to this subject again for the purpose of adding new cases and to modify the statement then made concerning the etiology of these cysts. Since then the following additional cases have been reported.

CASE I.—Dixon (*Medical Record*, March 15, 1884) reports an interesting case of cyst of the pancreas, which terminated in death from compression of the bile-duct by the cyst. The patient was a male, forty-two years of age, who during a period of three months had suffered from three attacks of what seemed to be cholelithiasis, before he came under the reporter's care. For the last ten days he became jaundiced. On examination a tumor was found in the region of the gall-bladder, about four inches in diameter, which fluctuated on palpation and ascended and descended synchronously with the respiratory movements, and received the impulse from the underlying aorta. The tumor was punctured and four ounces of a yellowish-red fluid removed which solidi-

fied on exposure to the air.   Two days after the puncture the tumor was considerably larger than before.   The patient's strength gradually failed, until he died, thirty-four days after the puncture.   At the necropsy it was ascertained that the tumor was a cyst of the pancreas, with thick walls, and light yellow mucous contents.   The cyst occupied the head and part of the body of the pancreas and communicated with the ductus pancreaticus.   The tail of the pancreas also contained a small cyst.   The large cyst compressed the ductus choledochus in such a manner as to render it entirely impermeable.   It is evident that in this case a removal of the pressure by operative treatment might have restored the health of the patient by removing the cause of obstruction to the natural outlet for the bile.

CASE II.—Reported by Riedel (*Archiv für klinische Chirurgie*, vol. xxxii. p. 994).   A woman, forty-five years of age, noticed nine years ago a small tumor in the upper portion of the abdomen, which increased slowly in size until a year and a half before she was examined by Riedel.   After this time growth was very rapid, so that a great deal of pain and distress was experienced from the size of the tumor.   When she was examined the abdomen was filled completely with a fluctuating tumor, the pelvis and the lateral regions of the abdomen were free.   Laparotomy was performed August 27, 1884. The slightly adherent omentum was easily separated, the cyst was tapped, and about ten litres of a brownish fluid escaped.   After evacuation of the cyst, the transverse colon could be seen immediately behind the symphysis pubis.   The mesocolon had been separated with the omentum.   The cyst was separated from the loose attachments with neighboring organs.   Troublesome hemorrhage only occurred from the depth of the wound near the vertebral column, where a ligature *en masse* was applied and several vessels tied ; the cavity of the wound, the size of two fists, was dusted with iodoform.   Death from peritonitis after ninety-six hours.   At the necropsy a portion of healthy pancreatic tissue was found ligatured with catgut.   The interior surface of the cyst showed, for the most part, a smooth surface without epithelium.   At different points it presented prominences which contained glandular tissue.

CASE III.—Reported by Salzer from Billroth's clinic (*Zur Diagnostik der Pancreascyste*, Prag, 1886).   Female, thirty-three years of age, not married, was sick with typhus fever when she was eighteen years old.   She stated that during her convalescence she noticed a swelling the size of a goose egg in the middle of the abdomen above the umbilicus which disappeared in a few weeks.   Four years later the swelling reappeared in the same place, was the size of a fist, but little movable, and rendered the umbilical region prominent.   The size of the tumor increased gradually until four years ago it had attained the size of a fœtal head, and had descended below the umbilicus.   A sensation of weight in the stomach, vomiting, pain in the abdomen, were the most prominent symptoms during the last fourteen days.   Menstruation regular. Before the operation a systematic and careful examination showed no disease in any other organ.   Circumference of abdomen below the umbilicus, ninety centimetres.   An unusually large vessel was detected in the abdominal walls in the left hypochondrium, which pulsated strongly, and over which, by auscultation, a bruit could be heard.   Abdomen prominent, especially in the median line.   On palpation the swelling was recognized as a round, smooth, fluctuating tumor, which was in direct contact with the anterior abdominal wall and could be moved slightly from side to side.   Percussion dulness over the entire area of the tumor.   Both lumbar regions resonant.   Spleen and kidney dulness normal.   A vaginal and rectal exploration showed that the cervix and uterus were pushed toward the right side, but movable.   Behind the uterus a firm tumor could be felt.   The diagnosis made at the time was unilocular cyst of the left ovary.   Laparotomy was performed June 5, 1885.   Median incision exposed the omentum over the cyst, slightly adherent.   An opening was made in the omentum, with blunt instruments, through which the cyst wall became visible.   The hand introduced through this opening showed the existence of firm adhesions of the cyst wall to neighboring organs.   After enlarging the external incision the gastro-colic ligament could be seen stretched over the cyst.

The transverse colon lined the lower border of the cyst, and had descended behind the symphysis pubis. When this portion of the intestine was elevated it was seen that the cyst belonged to the mesocolon. The separation of the cyst presented many difficulties, consequently its size was reduced by tapping, the opening was closed with pressure forceps, and enucleation commenced through a vertical slit in the gastro-colic ligament. Numerous mass ligatures had to be applied to arrest troublesome hemorrhage.

On the left side of the cyst the same enlarged vessel was met with that could be felt externally; it was found so intimately adherent to the cyst wall that it could not be isolated; it was, therefore, ligated double with the accompanying vein, and divided between the ligatures. To facilitate the deep dissection the incision was enlarged upward, and the cyst opened and emptied with the patient lying upon the side. The hand was introduced into the cyst, when it was found that the attached portion extended in an upward direction. The artery previously ligated had to be tied again higher up. In completing the tedious enucleation no pedicle was found.

From the position it could be ascertained that the base of the cyst was in the vicinity of the pancreas.

After careful arrest of hemorrhage at the bottom of the wound, and usual toilette of the peritoneum, the external wound was closed completely, no drainage being used. The patient, who had become considerably collapsed, was rallied by the administration of stimulants. In the evening, temperature was 37.6° C., pulse 72, pain in abdomen, and nausea. Restless during the night. During the next few days pulse became more frequent, jaundice and diarrhœa, great restlessness and collapse, which terminated in death on the sixth day after the operation. At the autopsy extensive purulent peritonitis was found to have been the cause of death. In the transverse mesocolon a hole was found, through which a fist could be passed. Through this opening a cavity, the size of a fist, was entered, the walls of which were infiltrated with blood and pus. In the bottom of this cavity the exposed pancreas was seen, which appeared divided transversely behind the head. Along the margin of the pancreas the splenic artery and vein were found ligated, and a portion of both vessels excised. The middle portion of the pancreas was absent. A portion of the tail of the organ, five centimetres in length, remained. Spleen enlarged to twice its normal size, otherwise normal in structure. Remaining organs healthy. A microscopical examination of the cyst showed that its walls contained pancreatic tissue. Inner surface not lined with epithelial cells.

CASE IV.—Reported by Kramer, operation performed by Hahn (*Centralblatt f. Chirurgie*, No. 2, 1885). Female, sixteen years of age, after an attack of vomiting and pain in the abdomen noticed a gradual distention of the upper portion of the abdominal cavity. The size of the tumor and the area of dulness corresponded to my case. The dulness appeared to be continuous with the hepatic dulness. Echinococcus cyst of the liver was diagnosticated. Laparotomy was performed, and the omentum divided between the stomach and the transverse colon. About two litres of an albuminous fluid were removed by tapping. The cyst was stitched to the margin of the abdominal wound, incised and drained. The patient recovered with an external pancreatic fistula, which continued to secrete pancreatic juice for four months.

REMARKS.—The experiments made for the purpose of ascertaining the effect of complete and permanent obstruction of the pancreatic duct, as detailed in the first part of the paper, have demonstrated conclusively that obstruction is not the only nor the most important element in the causation of a pancreatic cyst. That the ligated portion of the pancreas continued to secrete pancreatic juice was proven by the experiments on external pancreatic fistulæ, and yet, of the many cases of ligation of the pancreas, in not a single instance was a cyst, or even an attempt at the

formation of a cyst, observed. The only physical evidence of obstruction was apparent in a moderate and uniform dilatation of the duct behind the ligature. The most important etiological factor in cases of cysts of the pancreas must be sought in an arrest of absorption of the pancreatic juice, due either to a transformation of the pancreatic juice by the admixture of pathological products into a substance which is incapable of being absorbed, or to a loss of function in this direction of the vessels which perform this task.

The obstruction in the pancreatic duct may cause retention and accumulation of pathological products, but can never be the sole cause of retention of pancreatic juice in an otherwise healthy portion of the pancreas. In the cases where normal pancreatic tissue was found in the cyst-walls, it was more than probable that the pathological condition which had caused the obstruction did not effect complete physiological detachment of the peripheral portion of the pancreas; in other words, the obstruction was not complete. In cases where complete physiological detachment has taken place, either by the application of a ligature, or complete obliteration of the duct by pathological conditions, parenchymatous degeneration and atrophy in the detached portion is such a constant result, that the exceptions to this rule must indeed be few, if any. In the diagnosis of pancreatic cysts nothing new has been added. The history of the case, the primary starting-point of the tumor in the epigastric region, its gradual and almost painless growth, are points which should be carefully considered in the differential diagnosis of abdominal cysts. The treatment by extirpation, as only recently practised again by Riedel and Billroth, is not deserving of imitation.

The post-mortem examination in Billroth's case shows only too plainly the difficulties met with in identifying the tissues at such great depth, and of avoiding unnecessary injury to important structures. I wish again to repeat what I had to say on this method of treatment last year. Extirpation of the cyst would guard most effectually against the formation of a permanent pancreatic fistula, but, on account of the deep location of the pancreas, shortness or absence of a pedicle, and the many obstacles thrown in the way of the operator by adjacent organs, the procedure becomes one surrounded by innumerable difficulties and, in the present state of our science, of doubtful propriety. The formation of an external pancreatic fistula in the treatment of cysts of the pancreas has been so uniformly successful that it should be invariably adopted in preference to excision, and the latter operation should only be resorted to in cases where portions of the cyst wall have become the seat of malignant disease, likewise in cases where life is threatened by hemorrhage into a cyst by rupture of vessels lining the interior of the cyst, and which cannot be controlled by simpler and less hazardous measures.

Tumors of the Pancreas.

Hypertrophy.

Störck (*Annus Medicus*, 1836, Schmidt's *Jahrbücher*, Supplement Band, 1836, p. 161) mentions a case of intestinal obstruction caused by hypertrophy of the pancreas.

Case I.—A man, forty-eight years of age, previously in good health, had felt a sensation of weight and distress after meals, for more than six months. The flatulency also caused disturbance, and was relieved at times by drinking large quantities of water. Bowels constipated. The symptoms of obstruction developed gradually, but finally became so severe that nothing was retained on the stomach. After obstruction had become complete, the patient became collapsed and died two days later. At the autopsy no signs of inflammation or effusion in the peritoneal cavity could be found. Head of pancreas was found enlarged to the size of an orange, which had so completely compressed the duodenum that its lumen would only permit the passage of a goose quill. Pyloric portion of the stomach enormously dilated, so that this pouch resembled a kind of lesser stomach. The pancreas was softer, more succulent, and fleshier than normal, but not at all indurated.

Remarks.—As no microscopical examination of the tumor was made, we are unable to classify this case, but considerable doubt must remain whether it was a case of tumor or simple hyperplasia of the gland. The age of the patient and the effect of the tumor upon the duodenum make it quite probable that it was not a case of hypertrophy but carcinoma. The case illustrates the fact that tumors of the pancreas, when they occupy the head of the organ, are liable to produce intestinal obstruction by compression.

Sarcoma.

Of the malignant tumors of the pancreas, carcinoma is of much greater frequency than sarcoma. Only a very few cases of primary sarcoma of the pancreas are on record.

Case II.—Mayo (*Outlines of Human Pathology*, p. 411) mentions a case of primary sarcoma of the pancreas, with secondary invasion of the stomach, that came under his care. The patient, a man aged thirty-five years, died after an obscure illness which lasted eight months, during which time it was impossible to locate the disease. He dated his illness back to a febrile attack, which left him in a debilitated condition; and from that time he was liable to dyspeptic symptoms, with variable appetite and undefined uneasiness in the epigastric region. A high degree of anæmia was a conspicuous symptom during life. Although the appetite remained good, and digestion did not appear to be very much impaired, emaciation progressed rapidly. On inspection, all the internal parts were found remarkably pale, and void of blood; the heart healthy, but remarkably empty. The pylorus was thickened and firmer than usual, and had contracted adhesions to the pancreas. The pancreas was considerably enlarged and of nearly cartilaginous hardness, except some spots, which were soft, with the appearance of medullary sarcoma. No other disease could be detected in any other part of the body.

Case III.—Lépine and Cornil ("Contribution à l'anatom. path. du pancréas," *Gaz. Méd. de Paris*, 1874, p. 624) examined the body of a man, sixty-two years of age, who had been sick for eleven months, and had suffered from obstinate vomiting for seven months. The head of the pancreas was found

very much enlarged; the remaining portion of it was normal. The small curvature of the stomach was adherent to the tumor, the pyloric orifice thickened and its lumen narrowed. The adhesions involved also the liver, diaphragm, and lower surface of the lung. White metastatic nodules were found in both kidneys. Under the microscope, section of the tumor revealed a sarcomatous structure.

REMARKS.—In the two cases related here we have the principal types of clinical behavior of sarcomatous tumors. In the first case the disease involved almost the entire organ, having given rise to extensive local destruction without metastasis; in the second case the disease was limited locally to the head of the pancreas, while it had extended early by contiguity to adjacent organs and by metastasis to distant organs.

Friedreich (Ziemssen's *Cyclopædia*, vol. viii. p. 614) claims that at present we are acquainted with only one reliable case of primary sarcoma of the pancreas. It is described by Paulicki, and was found to be of the small-celled variety; it was taken from the body of a young man who had died of pulmonary and intestinal phthisis. It had not given rise to any noticeable symptoms during life.

Carcinoma.

It is claimed by some pathologists that primary cancer of the pancreas is an exceedingly rare affection, and that in the majority of cases in which this organ is the seat of the lesion, it occurs as a secondary affection, having reached it by extension from an adjacent organ, especially from the pyloric extremity of the stomach. While this may be true in many cases, quite a number of specimens have been examined in which the disease occurred here as a primary affection. Suche ("De Scirrho pancreat. nonnula," Dissert. Berol., 1834) appears to have examined a specimen which affords a good illustration of primary cancer of the body of the pancreas. The middle of the gland was converted into a hard, irregular, nodulated mass, of the size of a fist, which rested directly upon the aorta, which imparted to it pulsation during life. When cut into, the tumor grated under the knife, and the cut surfaces presented a laminated appearance. The substance of the tumor was traversed by numerous large veins; both extremities of the pancreas were healthy, and no secondary nodules could be found in any portion of the body. A primary cancer of the pancreas is also described by Schupman (*Hufeland's Journal*, 1841), where the tumor had formed adhesions with the spleen, while the liver contained a number of metastatic deposits. The terminal extremity of the pancreatic duct contained a cylindrical calculus with a number of arborescent projections, which corresponded to the contributory ducts. In another case, reported by Récamier (*Rev. Méd.*, 1830), the cancerous tumor, which involved the tail of the pancreas, was connected with the left kidney and compressed the ureter. The right half of the pancreas was healthy, the diseased

portion gray, hard, and lardaceous. The pelvis of the left kidney, in consequence of the compression of the ureter, was hydronephrotic. The remaining organs were healthy.

Bright, in 1832, reported a number of cases of primary carcinoma of the pancreas, with a special view of illustrating the effect which disease of this organ would have upon the digestion of fat. In three out of eight cases he noticed fatty diarrhœa, and he was inclined to the belief that this symptom, when present, was almost pathognomonic of the existence of disease of the pancreas ("Cases and Observations Connected with Disease of the Pancreas," *Medico-Chirurgical Transactions*, vol. xviii. p. 1).

In all cases the fatty diarrhœa was associated with jaundice. The following post-mortem account (p. 17) leaves no doubt that the disease was primarily limited to the pancreas:

"The cause of the pressure on the bile-ducts was immediately obvious; for, on placing the hand near the pylorus, a hard lump, of the size of a common egg, was easily felt, and was soon discovered to be the head of the pancreas itself, and not the glands surrounding that part, forming a yellow mass like the boiled udder of a cow, almost cartilaginous in hardness. Its texture was uniformly hard and unyielding, and the whole pancreas partook of the same, but in a less degree. The head of the pancreas was firmly and inseparably glued to the duodenum, and the hardness very nearly surrounded the viscus."

As undoubted instances of primary cancer of the pancreas, we must mention the published cases of Muehry (*Casper's Wochenschr.*, No. 10, 1835), Albers (*Med. Corrspbl. rhein. u. westf. Aerzte*, No. 8, 1843), Haldaure (*Assoc. Med. Journ.*, May, 1854), Webb (*Phila. Med. Times*, vol. ii., December, 1871), Gross (*Ibid.*, vol. ii., June, 1872), Luithlen (*Mem. a. d. aerztl. Praxis*, 1872, vol. xvii. p. 309), Roberts (*British Med. Journ.*, Sept. 1865), Wagner (*Archiv d. Heilk.*, vol. ii. p. 285), Bowditch (*Boston Med. and Surg. Journ.*, July, 1872), Davidsohn (*Ueber Krebs der Bauchspeicheldrüse*, Dissert. Berlin, 1872), Williams (*Med. Times and Gaz.*, August, 1852), and Frerichs (*Klin. d. Leberkrankheiten*, vol. i. pp. 146 and 153), as referred to by Friedreich ("Diseases of the Pancreas," *Ziemssen's Cyclopædia*, vol. viii. p. 608).

According to Da Costa (*North Am. Med. Chir. Review*, September, 1858), cancer of the pancreas is more frequent in the male than in the female, and in preference attacks people more than forty years of age. It usually appears as a firm tumor or scirrhus, with a well-developed connective tissue reticulum. Other varieties of carcinoma have been described. Thus, Wagner observed a cylindroma, and Lücke and Klebs have each met with the colloid variety. The primary starting-point is usually in the head of the organ, whence it extends in all directions. By extension within, it successively invades the body and tail of the organ, until the whole gland is involved, when it forms a nodulated spherical

tumor. The extension of the growth in an opposite direction soon reaches the duodenum, where it produces a narrowing or complete stenosis of that portion of the intestinal canal. A case of this kind is related by Hœlscher, in which the duodenum was constricted to such an extent that it was entirely impermeable, and the patient suffered for several days from symptoms of intestinal obstruction. While cancer of the stomach is liable to extend to the pancreas, the reverse is not frequently observed. When the carcinoma develops primarily in the pancreatic ducts, it belongs to the variety called cylindroma. The lymphatic glands in the vicinity of the pancreas are invariably affected during the later stages of the disease.

Stearrhœa is an important but not infallible symptom of cancer of the pancreas. It is attributed to an absence of the pancreatic juice from the intestinal canal, caused either by obstruction in the duct or suspension of the physiological function of the organ by the neoplastic infiltration. Epigastric pain is an early and important symptom, and is the result of compression of the cœliac plexus by the tumor. The pain often assumes a neuralgic character, and is usually not aggravated after taking food. Vomiting is a frequent symptom, and the matter ejected is generally a watery fluid, sometimes stained with bile. Constipation is an almost constant symptom. Progressive emaciation and anæmia attend malignant disease in any locality, but are unusually well marked in cancer of the pancreas. When the disease extends toward the duodenum, jaundice occurs from stenosis of the bile-ducts by compression or direct invasion by the neoplasm. Bruen has called attention to some forty cases of jaundice due to primary carcinoma of the head of the pancreas, lately reported by another observer, from which it is demonstrated that jaundice is an invariable symptom of primary scirrhus of the head of the pancreas, while it is uncommon when the disease is secondary, or affects the body or tail of the organ.

The most reliable evidence is the appearance of a tumor in the epigastrium behind the stomach. The difficulty of examining the pancreas during health by palpation is appreciated when a physical examination is to be relied upon in locating tumors in this locality. The normal pancreas can be felt only under the most favorable conditions through a thin and relaxed abdominal wall, but in determining its relative size this method of examination affords but little reliable information. A cancer of the pancreas, when it can be felt by palpation, appears in the epigastrium as a hard, immovable, or only slightly movable tumor, which is evidently deeply seated in the abdominal cavity. Under favorable conditions the connections of such a tumor with the pancreas can sometimes be demonstrated during life, but a positive diagnosis becomes impossible when, as in most of the cases hitherto recorded, it constitutes merely a part of a general tumefaction of the abdomen. As the tumor

is in such close proximity to the abdominal aorta the pulsations of this vessel are imparted to the tumor, and a bruit may even be heard over the compressed vessel; but, in contradistinction to aneurism, the pulsation is felt in only one direction, and the bruit disappears when the patient is placed in the knee-elbow position, as the tumor is lifted from the vessel by the force of gravitation.

That the tumor cannot be always felt is evident from the statement made by Da Costa that he recognized it in only 13 out of the 137 cases he reported; and Bigsby, in an analysis of 15 cases, alludes to its being recognized in only 4.

From what has been said, it will be seen how uncertain the symptoms are in the diagnosis of cancer of the pancreas. A satisfactory conclusion can be reached only after a careful consideration of the history of the case combined with a systematic elucidation of all the symptoms presented, and more particularly by resorting to the advantages to be derived from a systematic and careful study by exclusion.

A positive diagnosis of malignant disease of the pancreas is only possible after the tumor has attained sufficient size to be recognizable by palpation, consequently too late for a radical extirpation. When the disease has advanced to this stage it has already involved the greater portion of the gland and, as a rule, has invaded important adjacent organs. Another important element in the surgical treatment of cancer of the pancreas consists in the fact that the disease, as a rule, develops primarily in the head of the organ, a location which, in itself, precludes the propriety of an operation. The most favorable conditions for extirpation are presented if the disease is primarily located in the tail of the pancreas, and has not passed beyond the limits of the capsule of the gland. In such a case, excision of the splenic extremity of the pancreas would offer a fair prospect for a permanent result without endangering, as a remote consequence, the process of digestion, as a sufficient amount of secreting structure would remain in connection with the intestine to maintain pancreatic digestion.

Billroth, in two instances, made a partial resection of the pancreas in removing carcinomatous tumors of adjacent organs. In one case he removed a portion of the head of the pancreas with a cancer of the pylorus, and in another case he removed the tail of the pancreas with a sarcomatous spleen. Both patients recovered from the immediate effects of the operation. In the case of partial excision of the head of the pancreas it is to be assumed that the duct was not injured, that the organ continued to secrete, and the pancreatic juice was discharged into the duodenum through the uninjured duct. In operating upon the head of the pancreas for malignant disease which has extended to it from an adjacent organ, it is essential to preserve the continuity of the duct, so as to prevent physiological detachment of the remaining portion of the

gland, an accident which would be followed by degeneration and complete atrophy, consequently suspension of pancreatic digestion.   If an operation is performed for cancer of an adjacent organ, and the disease has extended to the splenic extremity of the gland, the operation should not be completed without removing a sufficient portion of the pancreas to guard against a local recurrence of the disease in this organ.   As in cases of partial excision of the pancreas for other lesions, the pancreas should be ligated before it is divided, so as to prevent troublesome hemorrhage, and at the same time guard against extravasation of pancreatic juice into the peritoneal cavity.

TUBERCULOSIS OF THE PANCREAS.

Primary tuberculosis of the pancreas is an exceedingly rare affection; indeed, some pathologists, among them Louis and Lebert, doubt its primary origin in this organ.   Cruveilhier only mentions tubercular degeneration of the lymphatic glands upon the surface of the pancreas. In diffuse miliary tuberculosis of the abdominal organs Klebs could find no nodules in the substance of the pancreas on microscopical examination.   But in such a condition the gland is often found in a state of parenchymatous degeneration which has been incorrectly interpreted as the first stage of tuberculosis by Ancelet.

When the lymphatic glands around the pancreas have undergone cheesy degeneration we sometimes find similar deposits in the pancreas, which, however, may be cheesy lymphatic glands in the substance of the pancreas itself.   Hartmann mentions a case where the pancreas had disappeared completely and its place was occupied by a cheesy mass. Although the pancreas is not disposed to tuberculosis, we have reliable information that in a number of cases this gland was the primary seat of the process.

CASE I.—Reported by Aran (*Archiv gén. de Méd.*, 1846).   The patient was a woman, twenty-five years of age, who died of a lingering disease.   She had been sick for a year, during which time she felt exceedingly weak, had frequent attacks of vomiting, and the skin became deeply bronzed, in some places almost black.   The pain, which was severe at times, was referred to the epigastrium.   The necropsy showed a tubercular deposit in the tail of the pancreas the size of a hen's egg, surrounded by a zone of miliary deposits in the substance of the gland.   Miliary tubercles were also found in the spleen.

CASE II.—Mayo (*Outlines of Human Pathology*, p. 410) describes a case where we have reason to believe that the process commenced primarily in the pancreas.   The patient was an inmate of Middlesex Hospital, and was under the care of Dr. Wilson.   He was thirty-eight years of age and had been ill for sixteen weeks; during the last seven weeks he was confined to his bed. The first symptoms were pain in the abdomen extending along the right hypochondrium to the spine.   Twenty-eight days before death he became jaundiced, stools white, urine high colored; for some time he could lie on the right side only, and was often obliged to sit upright to draw breath.   A large abdominal tumor had been felt immediately above the umbilicus some time before death, and the right arm and side of the neck had become œdematous.

Autopsy: serous effusion into the right pleural cavity. The gall-bladder was distended to a great size so as to contain eight ounces of fluid. The distention arose from an enlargement of the pancreas, the head of which formed an irregular sphere four inches in diameter, which had compressed the gall-duct; the rest of the gland was likewise enlarged. In parts it presented its natural texture and color, at other parts it was infiltrated with tubercular matter, which at two or three points had softened and formed thick pus. A few lymphatic glands, the thymus gland, and kidneys, appeared to be secondarily involved.

REMARKS.—Although in both of these cases the symptoms during life pointed to disease of the pancreas a sufficiently positive diagnosis to warrant a laparotomy could only have been made after a palpable tumor appeared, and after this time the disease had already passed beyond reach by the appearance of miliary deposits in other organs, an occurrence which would preclude the justifiability of any operative interference. Should abdominal section be performed in a case of tubercular peritonitis, and should such a condition in the pancreas be found as in Aran's case, it would be proper to extirpate the terminal end of the pancreas inclusive of the tubercular abscess.

In Wilson's case the tubercular deposit in the pancreas gave rise to a large abdominal tumor due partly to the distended gall-bladder, and as such a condition might present itself to the surgeon, in these days of diagnostitial laparotomy, it might be advisable, and to the advantage of the patient to establish an external pancreatic fistula instead of closing the wound. Such a course would enable the surgeon to remove the cheesy material, disinfect the abscess cavity, and to treat its interior with iodoform, all of which, done under antiseptic precautions, would tend to modify favorably the local process.

The removal of compression of the bile-duct by the same procedure would also tend to reëstablish the interrupted communication between the bile-ducts and the duodenum by removing the cause of the stenosis.

LIPOMATOSIS OF THE PANCREAS.

Lipomatosis, or fatty infiltration of the pancreas, is a pathological condition of this organ which is characterized by a transformation of the interacinous connective tissue into fat in contradistinction to fatty degeneration of the parenchyma cells, which sometimes occurs as an independent affection. In cases of fatty infiltration the shape and size of the pancreas may remain normal, but the secreting structures themselves may have completely disappeared by pressure atrophy. This disease is of little interest to the surgeon, except that it may serve as a predisposing cause of interstitial hemorrhage, in which connection it has already received mention; it is here again alluded to as a separate affection to demonstrate that gradual atrophy of the pancreas, even to the extent of complete disappearance of the glandular structures may occur without

causing serious impairment of the digestion. Rokitansky (*Lehrbuch der path. Anat.*, vol. iii. pp. 313 and 369) has found this condition of the pancreas generally as a part and parcel of a general obesity, especially in intemperate persons, together with fatty liver, heart, and omentum. In the three cases of pancreatic apoplexy described by Zenker, the fatty infiltration of the pancreas was only one of the many evidences of a diffuse malnutrition of the tissues. In some of these cases the patients exhibited no symptoms during life indicating the absence of the pancreatic secretions, and yet, on making the post-mortem examinations, complete destruction of the glandular structure was found.

Litten has reported three cases of complete atrophy of the pancreas, in which, during life, no symptom of pancreatic disease was observed, such as fatty stools, salivation, lipuria, bronzed skin, cœliac neuralgia, etc. (*Charité Annalen*, 1881). In two cases the atrophy was due to pressure, and in one instance it was caused by primary cancer of the pancreas.

In other cases the suspension of the pancreatic function by fatty degeneration of the organ produces well-marked symptoms during life, and may even result in death. Such a case is reported by Lépine and Cornil (*Gaz. Méd. de Paris*, p. 624). The patient was a drunkard, fifty-seven years of age. For six months he had been ailing with indigestion, marked loss of weight, diarrhœa alternating with constipation, no fever, no vomiting. For two months his body was covered with an eruption, and his feet became œdematous. At the autopsy the pancreas was found normal in size and shape, but the parenchyma of the gland had entirely disappeared, and its place was occupied by adipose tissue. The pancreatic ducts were filled with a viscid whitish fluid and small concretions. No other cause of death could be found in any of the remaining organs. Clinical observation appears to confirm the results obtained by experiments on animals, that in some instances complete gradual atrophy of the pancreas is compatible with normal digestion, while, in other cases, the suspension of the pancreatic secretion is followed by serious disturbance of digestion, marasmus, and death from inanition.

The only plausible explanation of the different effects of the same cause can be found in the supposition that in some individuals the compensating function of vicarious organs maintains normal digestion, while in others no such compensating action is established.

LITHIASIS OF PANCREATIC DUCTS.

Concretions of carbonate and phosphate of lime are frequently found in the pancreatic ducts. They are usually multiple, small, whitish, smooth, or of rough and irregular shape. Calculi in this locality have been found which measure more than an inch in diameter. In Shupmann's case, the calculus weighed 200 grains and measured one and a

half Paris inches in length, and from five to six Paris lines in diameter; having a crystalline surface, with processes running into smaller ducts. It was found in the left extremity of Wirsung's duct.

Sometimes the concretions of calcium phosphate and carbonate exist in incrustation of the mucous lining of the ducts. According to Collard de Martigny, the calculous concretion is sometimes composed of phosphate of lime alone. The calculi in this locality are usually solid formations, of fine granular structure with somewhat rough surfaces and very often covered with sharp points of projection. In some specimens the stone presents numerous branches which correspond to smaller pancreatic ducts. The irritation incident to the presence of a calculus in the pancreatic duct is followed by consecutive pathological changes in the duct and glandular tissue of the organ itself. The substance of the organ in the immediate vicinity of the stone becomes the seat of interstitial inflammation, followed by atrophy and sclerosis; the cicatricial tissue produced by this change causes contraction, an occurrence which may still further aggravate the obstruction. In most instances this inflammatory process does not remain localized but extends over the entire gland, as in the cases observed by Engel, Elliotson, and Curnow. In some cases the concretion gives rise to suppuration, as in Portal's case. His patient had died suddenly with symptoms of aneurism of the aorta, and at the autopsy an abscess was found in the head of the pancreas which contained a number of biliary and pancreatic calculi. In Fauconneau-Dufresné's case, as quoted by Ancelet, the left half of the pancreas contained a number of abscesses, one of which had perforated into the stomach. The pus contained numerous concretions from the size of a pin's head to that of a bean. Salmade observed a case of lithiasis complicated with abscess of the pancreas, where the swelling compressed the underlying aorta to such an extent, that death was produced by the rupturing of a vessel from overdistention on the proximal side of the obstruction.

Mr. Moore (*Lancet*, Jan. 12, 1884) presented to the Pathological Society of London, the pancreas of a man, aged forty-three years, who died in St. Bartholomew's Hospital of an attack of pleurisy following gouty symptoms. The main duct of the organ was slightly dilated and contained a calculus of irregular shape, around which was a large abscess in the head of the organ. This abscess pressed upon the orifice of the bile-duct sufficiently to produce great distention of the gall-bladder. A number of cases of cysts of the pancreas have been reported in connection with a calculus in the duct on the proximal side of the cyst, and in which the dilatation of the duct was attributed to obstruction, due to the presence of the foreign body in the duct. Complete stenosis of the pancreatic duct, due to intrinsic or extrinsic causes, is always followed by parenchymatous degeneration of the glandular tissue on the peripheral side of the seat of obstruction, which necessarily arrests the physiological

function in that portion of the organ, hence we are unable to explain the retention of the secretion from this cause unless impaction of the calculus takes place suddenly. Again, assuming this to be the case, we know that healthy pancreatic tissue will remove its own secretion by absorption in case of sudden stenosis or obstruction of the duct. We are therefore forced to explain the occurrence of a pancreatic cyst in the course of gradual or sudden obstruction of the ducts by a calculus, cicatricial or malignant stenosis, to parenchymatous changes in the peripheral portion of the gland rather than to the obstruction. This argument, of course, applies only to the so-called retention cyst. Simple, uncomplicated obstruction of the duct may give rise to accumulation of pathological products which under no circumstances are amenable to removal by absorption. The former assertion is well illustrated by the specimen which Norman Moore (*Lancet*, Jan. 12, 1884) exhibited before the Pathological Society of London, which showed great dilatation of the common pancreatic duct throughout its entire length. Near the orifice the duct was obstructed by a small calculus of irregular shape. The whole gland was hard, and to the naked eye showed great connective tissue hyperplasia. The papilla in the duodenum was enlarged and the hardened tissue of the pancreas constricted the bile-duct so as to cause complete obstruction. The liver showed secondary changes due to the stasis of bile. A microscopical examination of the specimen showed it to be a case of genuine cirrhosis of the pancreas, only a small number of acini remaining in healthy condition. In this case the cirrhotic change in the organ was undoubtedly produced in the same manner as by constriction of the duct as practised in the experiments on animals, the first link in the chain of pathological changes being the mechanical obstruction of the duct by the calculus.

Positive diagnosis of pancreatic lithiasis during life is impossible. Calculi and concretions have been found at post-mortem examinations of persons who, during life, did not suffer from any symptoms indicating such conditions. Pain, fatty stools, hæmatemesis, diabetes, are symptoms sometimes associated with this lesion of the pancreas, but when present they point rather to the existence of a consecutive lesion of the substance of the gland produced by the calculus than to the presence of the calculus itself. If the calculus be arrested at the outlet of Wirsung's duct it may, at the same time, obstruct the outlet of the bile by compressing the ductus choledochus and so cause jaundice. But the same effect can also be produced by cirrhosis of the head of the pancreas, with or without the presence of a calculus in the pancreatic duct. Mr. Morris claims that he has seen cases of pancreatic stone colic, but in such cases it would be impossible to differentiate between the passage of a biliary and a pancreatic calculus along their respective ducts, as a biliary calculus may obstruct the common pancreatic duct and *vice versâ*.

As the diagnosis of a calculus of the pancreas, *intra vitam*, is impossible, the surgical treatment must be limited to the management of some of its consecutive lesions—cysts, abscess, and retention of bile.

The treatment of cystic disease and abscess of the pancreas has been considered under their respective headings, and I will only add that when these conditions have been caused by an impacted calculus, an effort should be made to recognize the primary cause and, if possible, to remove it. As the surgical treatment of retention of bile due to the mechanical obstruction of the biliary passages is now receiving much attention, it is well, in this connection, to call the attention of surgeons to impaction of a pancreatic calculus in the duodenal portion of the pancreatic duct as an occasional cause of obstinate jaundice. If, in a case of this kind, abdominal section should reveal the true nature of the obstruction, an effort should be made at the time to force the calculus into the duodenum by taxis, and if this cannot be accomplished, the propriety of cutting for the stone should be carefully considered. As an impacted calculus in this locality not only endangers the life of the patient by cholæmia, but may also destroy life suddenly by perforation into the abdominal cavity, it would be not only justifiable but good treatment to remove it after a positive diagnosis has been made by means of diagnostitial laparotomy. The greatest danger attending such a procedure would be extravasation of bile into the peritoneal cavity. This accident should be guarded against by removing the retained bile by aspirating the dilated bile-ducts as a preliminary measure. After extraction of the stone the incision in the duct should be accurately closed with fine silk sutures. The secretion of bile and pancreatic juice should be reduced to a minimum after the operation by keeping the digestive organs in a condition of absolute physiological rest during the time required for the healing of the visceral wound.

In conclusion I submit the following propositions:

1. Restoration of the continuity of the pancreatic duct does not take place after complete section of the pancreas.

2. Complete extirpation of the pancreas is invariably followed by death, produced either by the traumatism or gangrene of the duodenum.

3. Partial excision of the pancreas for injury or disease is a feasible and justifiable surgical procedure.

4. Complete obstruction of the pancreatic duct, uncomplicated by pathological conditions of the parenchyma of the organ, never results in the formation of a cyst.

5. In simple obstruction of the pancreatic duct, the pancreatic juice is removed by absorption.

6. Gradual atrophy of the pancreas from nutritive or degenerative changes of the secreting structure is not incompatible with health.

7. Physiological detachment of any portion of the pancreas is invariably followed by progressive degeneration and atrophy of the glandular tissue.

8. Extravasation of fresh normal pancreatic juice into the peritoneal cavity does not produce peritonitis, but is promptly removed by absorption.

9. Crushed or lacerated pancreatic tissue is removed by absorption, provided the site of operation remains aseptic.

10. Complete division of the pancreas by elastic constriction is never followed by restoration of interrupted anatomical continuities.

11. Limited detachment of the mesentery from the duodenum, as required in operations upon the pancreas, is not followed by gangrene of the bowel.

12. In all operations upon the head of the pancreas, the physiological connection of the peripheral portion of the gland should be maintained by preserving the integrity of the main pancreatic duct.

13. Partial excision of the splenic portion of the pancreas is indicated in cases of circumscribed abscess and malignant tumors, in all cases where the pathological product can be removed completely without danger of compromising pancreatic digestion or inflicting additional injury upon important adjacent organs.

14. Ligation of the pancreas at the point or points of section should precede extirpation as a prophylactic measure against troublesome hemorrhage and extravasation of pancreatic juice into the peritoneal cavity.

15. The formation of an external pancreatic fistula by abdominal section is indicated in the treatment of cysts, abscesses, gangrene, and hemorrhage of the pancreas due to local causes.

16. Abdominal section and lumbar drainage are indicated in cases of abscess or gangrene of the pancreas where it is found impossible to establish an anterior abdominal fistula.

17. Thorough drainage is indicated in cases of abscess and gangrene of the pancreas, with diffuse burrowing of pus in the retroperitoneal space.

18. Removal of an impacted pancreatic calculus in the duodenal extremity of the duct of Wirsung, by taxis or incision and extraction, should be practised in all cases where the common bile-duct is compressed or obstructed by the calculus and death is threatened by cholæmia.

19. In such cases the principal source of danger, extravasation of bile into the peritoneal cavity, should be avoided by preliminary aspiration of the dilated bile-ducts, accurate closure of the visceral wound with fine silk sutures, and absolute physiological rest of the organs of digestion during the time required in the healing of the visceral wound.

A SHORT ACCOUNT OF THE DISEASE CALLED "AINHUM," WITH THE REPORT OF A CASE.[1]

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It was my fortune, in the month of May last, to meet with a case of the rare disease called ainhum[2] at the Montreal General Hospital. So far as I know, it is the first case of the kind that has been met with in Canada. I am indebted to my house surgeon, Dr. H. S. Birkett, for the report of the case and the preparation of the specimen illustrating it.

Case.—John B. S., æt. forty-seven, colored, native of North Carolina, and by occupation a teamster, was admitted into the Montreal General Hospital from Cornwall, Ontario, May 12, 1886, suffering from a painful toe which he wished to have removed.

History. Six years ago he noticed a small pimple on the outer side of the right little toe in the digito-plantar fold. He did not suffer any inconvenience or pain from the affection till four and a half years ago, when he noticed a constriction on pressure appearing in the digito-plantar fold. The foot was then slightly swollen and the toe was somewhat enlarged. With rest and poulticing the sore healed up and the pain and swelling of the foot disappeared, but the constriction remained and the toe continued enlarged. Four weeks ago the sore broke out again and the toe became very painful. The furrow, which had been increasing gradually, now rapidly deepened and the portion of toe beyond became much swollen and pained him greatly when he walked. Patient has always been healthy and lived in North Carolina till twenty years ago. No member of his family, to the best of his knowledge, ever had a similar affection of the toes.

Condition on entrance. Patient, a strong, healthy, full-blooded negro, complains of inability to walk much on account of the severe pain in the little toe of the right foot. Upon examination this toe is found to be very much constricted at the digito-plantar fold, the constriction almost completely encircling the toe—in fact, it looks as if a string had been tied tightly round it. The portion of toe beyond the furrow consists of a soft ovoid mass and is much larger than the normal toe. Nail quite healthy. The toe is very mobile and movement causes excessive pain. On the plantar aspect of the constriction is a small granulating sore which, on probing, is very sensitive. Foot not swollen. No other toe of either foot affected. Left little toe carefully examined and found perfectly normal.

On the 14th of May the toe was amputated at the metatarso-phalangeal joint, and the wound, under dry dressing and iodoform, rapidly healed.

On dissection the amputated toe appeared to consist of much thickened skin and fibrous tissue. Adipose tissue normal. The bones presented a remarkable condition. The proximal phalanx was much atrophied and

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[2] This is the negro name for this affection. It means "to saw."

ended in a fine point, the whole bone looking something like a claw; the joint between it and the middle phalanx had disappeared; the middle phalanx was much reduced in size and eroded at its proximal end, no distinct articulation could be made out between it and the ungual phalanx. This latter phalanx, though of proper length, was excessively thin and light.
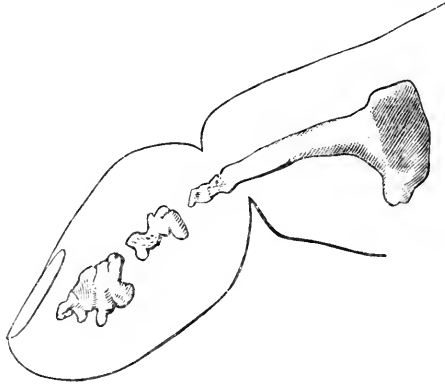
Showing the line of constriction and the condition of the three phalanges.

The metatarso-phalangeal joint was perfectly healthy, though the end of the phalanx entering into the joint was somewhat lessened in size and misshapen but the articular surface was of full size.

The disease called "ainhum" is one of great rarity; it is peculiar to the dark races, not only to negroes, as was formerly supposed, for it occurs also in India among the native Hindoos. A very interesting report of four cases, by Dr. D. G. Crawford, of the Indian Medical Service, has lately appeared.[1] Dr. Crawford found that the disease was met with in about one out of every 2500 surgical cases treated at his Dispensary at Calcutta. In one of his cases the great toe was affected, in one the fourth toe, and in two the fifth toe. In no case was there any appearance of symmetry. The disease at one time was thought to attack the little toe only, but later observers have seen it in the fingers and even in the legs. It is said to occur in intrauterine life, and to be the most frequent cause of congenital amputation.[2] Only very few cases have thus far been reported in North America; in South America, however, it is comparatively common in the African negroes, but rarer in those born in Brazil. It is said to be a common affection on the West coast of Africa.[3] The disease was first clearly described by Dr. J. F. da Silva Lima, of Bahia, Brazil, in 1867.[4] In the cases described by him the affection was confined to the little toes of adults, but lately

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[1] Edinburgh Medical Journal, June, 1886.

[2] C. Stedman in Buck's Reference Handbook, vol. i. p. 91.

[3] Dr. Rolf Leslie, who has lately returned from the Congo, where he spent two years, tells me that he never met with a case whilst there.

[4] Gazeta Medica di Bahia, Anno I., No. 13, p. 146, quoted by H. Weber, Path Soc. Trans., 1867, vol. xviii.

others have described it as occasionally being seen in children, and also, as mentioned above, affecting other toes, fingers, and even limbs.

Dr. Silva Lima found the disease to be more common in men than women; it is also said to be more prevalent in certain families, showing its hereditary, and, hence, constitutional nature. The only cases reported in North America are those by Drs. Hornaday and Pittman. In Dr. Hornaday's report of his case[1] he refers to one previously reported by Dr. N. J. Pittman, in 1880, to the North Carolina Medical Society. It was the first case Dr. Pittman had met with in a practice extending over forty-two years.

Dr. Hornaday's case occurred in a negress aged ten. It is curious that the man whose case is narrated above is a native of North Carolina.

As a rule, the affection commences as a furrow on the line of the digito-plantar fold of the little toe; this furrow gradually deepens, and the end of the toe enlarges to double or treble its normal size, having a spherical shape. Generally there is no pain, inflammation, or ulceration, but when there is ulceration in the furrow, as in my case, the pain is excessive.[2] As the furrow goes on deepening, it encircles the toe till the end is held by only a small pedicle. The toe does not lose its sensation, but from its great mobility it is subject to injury and painful knocks and the patient in consequence applies for relief. The toe is generally removed at the point of strangulation by knife or ligature. If left alone it falls off itself. The wound always heals rapidly. It is asserted that the disease can be arrested in the early stages by free longitudinal incisions cutting through the constricting fibres.

The course of the disease is very slow, lasting some eight to ten years. According to Silva Lima, the disease is usually asymmetrical, the affection in one toe being much further advanced than in the other. The phalanges atrophy and are replaced by fibrous tissue and the joints disappear. The skin is much thickened and there is great hypertrophy of the papillary layer; the bloodvessels are also thickened and become larger.[3]

The cause of the disease is not known. The fact that sensation is not lost distinguishes it from leprosy, as does, also, its localization. It is probable from the great atrophy of bone which takes place, that the disease is of nervous origin and is due to some trophic disturbance of the nerve centres. Microscopic sections of removed toes present no peculiar appearances; so much is this the case that when a report on a toe affected with "ainhum" was presented to the American Dermatological Society, in 1880, by a previously appointed committee, they suggested

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[1] North Carolina Medical Journal, September, 1881.

[2] Dr. Crombie, Indian Medical Gazette, quoted by Dr. Crawford, in Edin. Med. Journ., June, 1886.

[3] Dr. H. Weber, Path. Soc. Trans., 1867, vol. xviii. p 279. In this article beautiful plates of microscopic sections are given.

the probability "that the constricting ring was produced artificially by tying a thin ligature round the toe which, if not continuously encircling it, was worn for long periods of time." [1]   No doubt, if a portion of the removed toe were placed in the hands of a skilled bacteriologist an " ainhum " bacillus would be found, which, when inoculated, would produce a similar disease in rabbits and mice. The experiments, of course, should not be performed with *white* mice or rabbits. I regret exceedingly that the soft parts of the toe removed by me were not preserved for purposes of investigation.

A CLINICAL STUDY OF CEREBRAL LOCALIZATION, ILLUSTRATED BY SEVEN CASES.

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During the past fifteen years great progress has been made in the study of cerebral localization, and it seems probable that in the immediate future the whole cerebral cortex will be mapped out into small areas ; each being associated with a definite and distinct mode of mental action, depending on the peripheral connections of the nerve fibres which terminate in that particular area. A scientific basis for the theory of cerebral localization was obtained by Meynert from a study of the comparative and finer anatomy of the brain ; and the wonderful advances made in our knowledge of cerebral anatomy by the researches of Meynert, Gudden, Flechsig, and others, have contributed largely to the perfection of this theory. More important, however, than anatomy in contributing facts in support of the theory of cerebral localization, have been the results obtained from experimental physiology, and from observations of disease in the human brain. Indeed, so large already is the accumulation of reported cases of cerebral disease which support the theory of cerebral localization, that the theory may in a general way be regarded as proved,[2] and it is desirable to publish only cases of such an unusual nature as will throw some light on the obscurity which still involves a great part of the subject. Such cases, it seems to me, are the following.

Of the seven cases here reported, one, Case II., was reported by Monakow in the *Archiv f. Psychiatrie*, the other cases are published now for the first time. I was present at the autopsies of Case I. and Case III.,

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[1] Hyde, Diseases of the Skin, p. 421.

[2] For a most excellent article on the localization of cortical lesions of the brain, containing an abstract of all the American cases and references to similar collections of foreign cases, see M. Allen Starr, AMERICAN JOURNAL OF THE MEDICAL SCIENCES, vol. 87, pp. 65 and 366, and vol. 88, p. 114. Since Starr's article appeared a number of additional cases have been reported, notably a collection published by C. Günther in Zeitschrift f. klin. Med., vol. 9, p. 1.

but not having seen the patients during their life, I was obliged to obtain the histories in part from the family of the patients, and in part from their physicians, Drs. Boyd and Merrill in Case I., Drs. Curtis and Van der Veer in Case III., who have kindly permitted me to publish the cases.

Case I. *Defect in the fields of vision involving the lower left quadrant of each. Atrophy of the lower half of the right cuneus.*

May 20, 1886. H. M., male, æt. fifty-seven, married, of extremely nervous temperament. In 1869 he had a severe attack of double pneumonia, and during the year following he had slight attacks of vertigo while walking, which were attributed to weakness; with this exception he never suffered from any severe sickness. From 1877 until his death, he was troubled by slight deafness and by more or less roaring in his ears, which was especially constant and severe during the last two months of his life. In 1882 he had a large carbuncle on his neck, and after that time he seemed less vigorous than before. In 1884 he began to notice that when hurrying or walking up hill he was frequently compelled to stand still on account of precordial pain; and on June 23d of that year he had a very severe attack of pain in the cardiac region, extending into the left arm, and accompanied by extreme pallor, profuse perspiration, and the conviction that he was dying. On June 29th he got out of bed early in the morning, and while stooping to place a basket of silver outside of the bedroom door he complained of vertigo, seemed bewildered, and repeated over and over again questions as to the time of day, where he was, etc. He could not find the bed although standing near it, and begged to be led to it. At eight o'clock he arose to dress, but could not remember which article of clothing he ought first to put on; he dared not cross the room as all seemed dark before him, and " he was on the edge of an abyss." Everything seemed changed to him, nothing natural, even his breakfast of clam broth when brought to him he called cucumbers. After breakfast he slept soundly for several hours. He awoke with pain over his right eye, and during that day and the next this pain continued and his face was flushed and hot, but he seemed to have little or no trouble with vision.

During the next week he went out on the street a little each day, and on July 5th he went to a large hotel in the country. The fatigue of the journey and the confusion of the hotel seemed to bring back the mental confusion or disturbance of vision. At times he seemed puzzled; he could not tell how he had entered the dining-room, nor remember his table in it, nor find his bedroom alone. He was timid and conscious of his trouble, and would not be left alone for a moment lest he should lose his way. This confusion of vision or of mind gradually passed away, but his family noticed that he did not see a dish or plate which the waiter offered him on his left side, and he often told of narrow escapes that he had from being run over on the street. In November, 1884, he became very dejected, morose, and melancholy, especially on religious subjects; at other times he became greatly excited. Early in December he was examined by Dr. Merrill, who found normal reaction of pupils, normal appearance of fundus, vision and color perception perfect, a defect in the fields of vision involving almost the whole of the left lower and the peripheral portion of the left upper quadrants in each field.

The defect was somewhat more extensive, especially as regards the upper quadrant, in the left field of vision than in the right.   The fields of

FIG. 1.
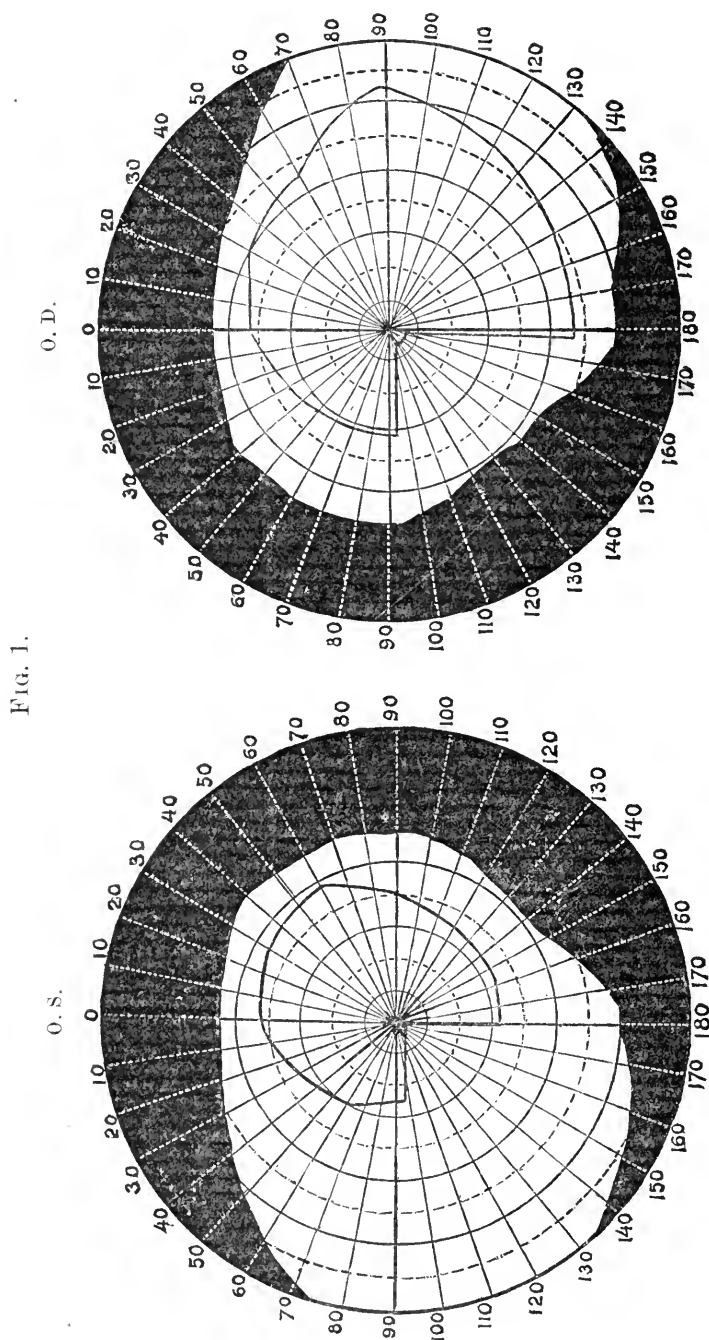
vision were carefully mapped out a number of times between December 3, 1884, and March, 1885, and always with the same result.

From this time the condition of the patient did not change materially. He continued to be very nervous and, at times, irritable and suspicious. He exhibited no paralysis of motion or sensation.   He had little or no

pain in the head, except that once after writing much, which always was a great mental strain for him, he complained of pain behind the left ear, and said that he had with it strange hallucinations. His memory was weak in regard to names; he often called the same person by several names, in the course of a conversation; while in other respects, as in recognizing faces, it was excellent. He slept but little, and in his sleep there was much twitching of his limbs. In 1885 he had another severe attack of angina pectoris, and for two weeks afterward he could walk only a short distance without bringing on a return of the pain. In February, 1886, he had his most severe attack of angina, lasting several hours, and from this attack until his death he was scarcely a day without pain in the precordia or in the arm. During the last month of his life he vomited often, the vomiting being apparently unconnected with any gastric derangement. He complained of increased dulness of vision and of greater angle of obliteration, and was much troubled by a new building near by appearing to be out of line. On May 7, 1886, while quietly walking in the street he sank gently to the ground and died.

Autopsy held thirteen days after death and after the body had been embalmed, which greatly altered the appearance of the tissues. Body was in a good state of preservation and the tissues cut like leather. Skull-cap and dura mater presented no abnormal appearance. Moderate atheroma of the cerebral arteries. Slight dilatation of both lateral ventricles. At a point on the median surface of the right occipital lobe there was a complete atrophy of the cerebral convolutions, only a trace of them remaining as a delicate gray gelatinous fringe. This atrophy was strictly limited to the lower half of the cuneus; being bounded below by the calcarine fissure, in front by the parieto-occipital fissure, and above by a curved line which started from the parieto-occipital fissure and arching backward across the middle of the cuneus terminated at the posterior border of the median surface close to the calcarine fissure.

Fig. 2.
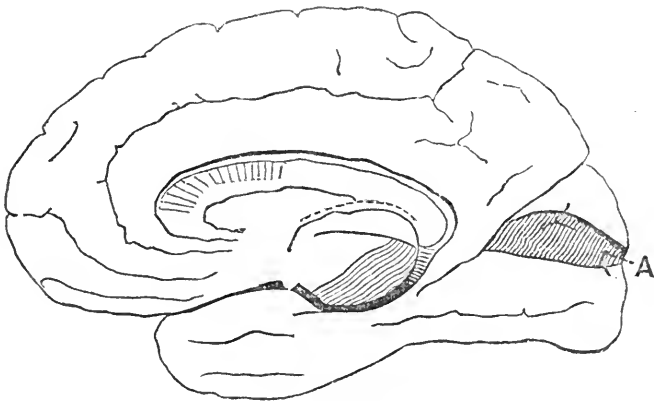
Median aspect of right hemisphere. (Ecker.)
A, point of attack.

The white matter underneath the point of atrophy was softened to a depth of about one-third of an inch. There was no deposit of pigment in the neighborhood. The corresponding point on the left occipital lobe showed no atrophy, nor did any of the other cerebral convolutions.

Sections through the brain substance, the optic thalami, and the other ganglia at the base revealed nothing abnormal. The optic nerves and tracts showed no macroscopic atrophy or degeneration. No microscopical examination was made.

The lesions found in the other organs were interstitial nephritis with cysts, moderate degree of atheroma of coronary arteries and of commencement of aorta. The wall of the left ventricle of the heart was very thin, without presenting any macroscopic increase of connective tissue, at a point near the middle of the posterior surface. No valvular lesion. General adhesive pleuritis. Patches of old cicatricial tissue, some of them calcified, were found at the apices of both lungs.

In this case there is a lesion which destroys the lower half of the right cuneus, and there is one constant symptom which is present during the whole course of the disease; a blindness limited to the lower left quadrant of the field of vision of each eye. In the absence of any other cerebral lesion the destruction of the lower half of the right cuneus must be regarded as the cause of the blindness in the lower left quadrant of each field of vision. Such a case as this, in which a homonymous *quadrant* of the fields of vision is lost and there is found as cause of it a limited cortical atrophy, has never been reported; and in order to understand its significance it is necessary to call to mind some well-established facts regarding the anatomy of the optic fibres.

That the cortex of the occipital lobes is the point of final termination of the nerve fibres which start from the retinæ and is the perceptive centre for sight may be regarded as definitely established, since the experiments of Munk[1] have been, in part at least, confirmed by numerous cases of disease in the human brain. It is now universally considered that in the optic chiasm there is a partial decussation of the optic fibres of such a nature that fibres from the outer half of each retina pass directly backward to the optic tract of the same side, while the fibres from the inner half of each retina decussate in the chiasm and pass to the optic tract of the opposite side. Each optic tract is made up, therefore, in part of fibres from the retina of the eye of the same side and in greater part of fibres from the retina of the opposite eye; the ratio of the crossed to the uncrossed bundle being as 3 to 2. Consequently, while a destructive lesion of an optic nerve causes a blindness of one eye, a lesion of the optic fibres at any point in their course between the optic chiasm and the cortex of the occipital lobe causes a blindness limited to one-half of the field of vision of each eye. Such a condition of things is called a lateral homonymous hemianopsia,[2] and it may be produced by a lesion, either of one optic tract, or of the pulvinar of one optic thalamus, or of the posterior part of one internal capsule, or

[1] Ueber die Functionen der Grosshirnrinde, Berlin, 1881.

[2] Hemianopsia means a loss of one-half of the field of vision, hemiopia means a blindness of one-half of the retina ; a right hemianopsia is, therefore, the same as a left hemiopia.

of the optic fasciculus as it passes backward from the internal capsule to the occipital lobe, or of the white matter of the occipital lobe, or of the cortex of the occipital lobe. A number of cases have been reported in which the lesion was confined more or less accurately to one or the other of these parts.[1] In all such cases when the lesion is situated on the left side of the brain the blindness is limited to the right half of each field of vision, and when the lesion is situated on the right side of the brain the blindness is limited to the left half of each field of vision. In many of the reported cases the hemianopsia is complicated by the presence of other nervous symptoms, which vary in character according to the situation of the lesion. When the lesion is confined either to the medullary substance or to the cortex of the occipital lobe, the symptom of hemianopsia is alone present and the reflex action of the pupil to light is normal. When the lesion involves the posterior part of the internal capsule the hemianopsia is associated with hemianæsthesia, and, if the lesion be extensive, with hemiplegia also. In this case also the reflex activity of the pupil to light is normal, whereas when the lesion is further down in the course of the optic fibres the reflex activity of the pupil to light is abolished or greatly impaired. When the lesion involves the pulvinar, the hemianopsia is frequently associated with hemianæsthesia and hemiplegia, because the lesion is usually not limited to the pulvinar but involves also the internal capsule. When the lesion involves the optic tract the hemianopsia is usually associated with hemiplegia and paralysis of some of the ocular muscles. Finally the hemianopsia sometimes occurs associated with aphasia, alexia, word blindness, and more or less complete hemiplegia and hemianæsthesia as a result of extensive occlusion of the cerebral arteries, especially of the left middle cerebral. These points and many others in regard to hemianopsia are well stated in an excellent paper in the *Journal of Nervous and Mental Diseases*, 1886, p. 1, and also in the *Archives de Neurologie*, 1886, i. p. 176, by Dr. E. C. Seguin, which is the most valuable article on the subject of hemianopsia with which I am acquainted.

Although in Case I. the blindness was, for the most part, limited to one-quarter of the field of vision, yet it must be classed for the present among the cases of hemianopsia or of hemiopic defect ; because no class of tetartanopsia, to which it more properly belongs, is recognized. This case makes it probable that the fibres from the right upper quadrants of each retina terminate in the lower half of the right cuneus. It is true that not only the cortex of the lower half of the cuneus is completely atrophied, but also that the white matter immediately beneath it is the seat of softening. This focus of softening is, however, of little depth, and affects

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[1] For a summary of the literature see Seguin, Journal of Nervous and Mental Disease, 1886, p. 1 ; Starr, AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1884, i. p. 65 ; Marchand, Archiv für Ophthal., 1882, ii. p. 63.

principally the fibres running to the atrophied convolutions, and at most can involve only those fibres which run to the cortex in the immediate neighborhood of the atrophy. It may well be that this softening involving a few of the fibres running to the adjacent convolutions, causes the blindness in the peripheral portion of the left upper quadrant of each field of vision. So far then as this case shows anything in regard to the central termination of the optic fibres, it proves that the fibres from the upper right quadrant of each retina terminate in the lower half of the right cuneus.

Five cases have already been reported in which hemianopsia has been due to a lesion of the cuneus and of the adjacent part of the median occipito-temporal convolution;[1] so that it may now be considered definitely settled that in this portion of the cortex of the occipital lobe the fibres from homonymous halves of the retina have their final termination. Case I. not only supports this view but it carries the localization a step further, inasmuch as it shows that the fibres from the right upper quadrant of each retina terminate in the lower half of the right cuneus. The fibres from the right lower quadrant of each retina must, therefore, terminate either in the upper half of the right cuneus or in the right median occipito-temporal convolution. The cases of Seguin, Haab, and Heguinin can only be explained by this latter view; while the cases of Féré and Monakow can be interpreted either way. From an inspection of the plates in Seguin's article, which represent the cortical lesions that have been found in cases of hemianopsia, we are forced to the conclusion that *the fibres from the right upper quadrant of each retina have their final termination in the lower half of the right cuneus, and the fibres from the right lower quadrant of each retina terminate in the adjacent part of the right median occipito-temporal convolution.* Of course, the same relationship holds good between the left half of each retina and the left cuneus and left median occipito-temporal convolution.

If it be true that the optic fibres terminate in such a small portion of the occipital cortex, the question presents itself, What is the function of the remainder of the occipital cortex? That the cortex of the whole occipital lobe is the perceptive centre for sight, is shown not only by experiments on animals, but also by the fact that, in man, lesions of the occipital lobes, elsewhere than in the cuneus and median occipito-temporal convolution, cause disturbances of vision. It might be thought that, inasmuch as in most, if not in all, uncomplicated cases of hemian-

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[1] Heguinin and Haab, Klin. Monatsbl. f. Augenheilk., 1882, S. 141; Féré, Archives de Neurologie, 1885, I. 229; Monakow, Archiv f. Psychiat. u. Nervenkrankh., 1885, S. 151; Seguin, Journ. Nerv. and Ment. Disease, 1856, p. 1. In a sixth case reported by Wilbrand (in Gräfe's Archiv f. Ophthal., Bd. 31, S. 119), the lesion included this area but also extended beyond it, and in two cases, the one reported by Curschmann, and the other by Westphal, Archiv f. Psychiat. u. Nervenkrankh., Bd. 11, S. 822, the lesion involved this region, but also involved the white matter beneath it to a considerable depth.

opsia the central vision is intact, the very important fibres from the
macula do not run to the cuneus or to the median occipito-temporal con-
volution, but have a wide connection with the rest of the occipital cortex.
Such a supposition is immediately disproved by cases in which the lesion
involved either an optic tract[1] or an entire occipital lobe,[2] and yet cen-
tral vision was unimpaired; so that the fact that central vision is normal
in cases of hemianopsia, must be explained in some other way.[3]   The
function, then, of the rest of the cortex of the occipital lobe must be
sought in another direction, and in order to comprehend it, it is neces-
sary to have clearly in mind the more important elements of a complete
visual perception.

When the image of an external object is thrown upon the retina,
nervous impulses are conducted along the optic fibres to their point of
termination on the median surface of the occipital lobes, and give rise to
a visual sensation and a very simple representation of the external ob-
ject.   The perception of the object is something different from this, and
depends not only on nervous sensations originating in the retina, but
also on feelings of innervation of the ocular muscles which are either
taking place at the time of the perception, or by means of which in past
time each point of the retina has become associated with a relative posi-
tion in space.   Another element in a complete visual perception is the
binocular effect produced by a combination of the nervous impulses
coming from each retina.   The visual perception of an object is, therefore,
distinct from, and much more complicated than, the visual sensation
which is derived merely from the nervous impulses originating in the
retina unassociated by education with other sensations.   Such simple
visual sensations occur alone only in babies or in blind persons to whom
sight is suddenly restored; ordinarily the visual sensation is merged into
and lost in the visual perception.   Furthermore, every visual perception
produces a permanent change in the occipital cortex, in consequence of
which thereafter a memory of this perception is easily brought into con-
sciousness.   If the same object is seen again after a varying interval,
the perception calls up more or less easily the memory of it, and the
individual remembers that he has seen the same object before—he recog-
nizes it.   Every act of perception is almost inseparably connected with
an act of recognition.   It is very probable that the simple act of visual

[1] Hirschberg, Virchow's Archiv, Bd. 65, S. 116.
[2] Baumgarten, Centralbl. f. d. med. Wiss., 1878, S. 369.
[3] In order to explain the normal central vision found in cases of uncomplicated hemianopsia, Schweig-
ger (Gräfe's Archiv f. Ophthal., Bd. 22, S. 276) thought it possible that fibres from each macula lutea
might be connected with both cerebral hemispheres. Mauthner (Vorträge a. d. gesammte Gebiet d. Au-
genheilk., Bd. 1, S. 360) states, however, that since in cases of hemianopsia one half of the macula lutea
is intact, "upon this half of the macula images can be projected which are as sharply defined as ever,
and, therefore, the persistence of normal central vision is not remarkable." Certainly, in such cases it
requires but a very slight lateral movement of both eyes to throw the image on the healthy half of the
macula.

sensation may be associated with cellular activity in a different part of the occipital cortex from that accompanying the complicated acts of perception and recognition, and it is, therefore, quite possible that a lesion of the median surface of the occipital lobe destroying the point of termination of the optic fibres might cause complete blindness in the corresponding halves of the retinæ, and that a lesion of the convex surface of the occipital lobe might prevent full visual perception and might destroy all the memories of things that had been seen while simple visual sensation might be preserved.

In support of this view, and more especially on account of its great intrinsic interest, a very brief report is here introduced of a case of Monokow,[1] in which the symptoms were carefully observed, and in which the central nervous organs were examined with extreme care and exactness.

CASE II.—J. B., æt. seventy, an active, amiable, married man, with no hereditary taint. In 1878, he had several severe epistaxes, and soon afterward an apoplectic attack followed by a transient left hemiparesis, slight aphasia, hallucinations of sight and weakness of sight. These symptoms slowly disappeared and there remained only slight unsteadiness in walking, slight disturbance of sight, slight mental weakness and melancholia. In 1879, he had an epileptic attack, the convulsive movements being limited to the left side of the body, followed by a transient slight left hemiparesis, and the existing disturbance of vision (probably hemianopsia?) became more decided. He remained fairly well till January, 1882, when he complained that his sight was rapidly failing, although an ophthalmoscopic examination revealed nothing abnormal. In February, 1882, he had an apoplectic attack with transient left hemiparesis, blindness, hallucinations of sight, and disturbance of speech. Motility returned in a few days, but the disturbance of speech and an almost complete blindness remained. The patient, however, was no longer conscious of his blindness and did not even speak of dimness of vision, of which he complained in January. He often said that he was stupid, old, etc., but never that he was blind, although he thought that he was in a cellar and cried for light and fire. At other times he thought he was outside the house when he was really in it. During the last half year of his life the condition of the patient was substantially as follows: There was no disturbance of sensibility. The left hemiparesis was very slight. There was nothing abnormal about his speech except its irrelevancy due to his inability to understand spoken words. He heard noises and connected the proper associations with them. When, for example, the door was opened he asked who had entered. When he was spoken to he was conscious of it, listened attentively, and made answer, but his answer showed that he had not at all understood what was said to him. He understood only two words, "father" and "adieu." The patient had complete left hemianopsia. On the other hand, he saw things on his right side; he walked about the room without stumbling over the furniture; he found the door without difficulty and walked from one room into another; he found his bed and sat on it: but only when all these things were on his right side; to all things on his left side he was entirely blind. Although he saw things on his right side, more or less distinctly, yet he did not recognize them. He could not eat his food, though it was before him, and he was complaining of hunger; it was only when the food was placed in his hand and he felt it that he ate it greedily. Rapid and threatening movements of the fist toward his eye did not move him in the least. He could not recognize his wife except by the sense of touch. Often he called for his wife when she was by his side,

and she was able to quiet him only by caresses and petting, and not by her voice, nor by standing in front of him, nor on his right side. He took interest in things about him, had a good memory, and correct judgment. He had hallucinations of sight and hearing but had no delusions, and was cleanly in his habits. In November he became drowsy, the drowsiness deepened into coma, and he died on December 17, 1882. From the very accurate and minute report of the examination of the brain I mention only those lesions which interest us in this connection. In the right hemisphere was found an almost complete atrophy of the cuneus, the median occipito-temporal, and the descending occipital convolutions; and associated with this atrophy was a degeneration and atrophy of the optic fasciculus, the pulvinar, the external geniculate body, and the optic tract, all of the right side and of both optic nerves. In the left hemisphere was found a great atrophy of the superior and middle temporal convolutions, a slight atrophy of the middle and inferior occipital convolutions, and a softening of the white matter beneath all of these convolutions. The lesion of the right hemisphere was of older date than that of the left.

In this case the lesion of the right occipital lobe caused a left-sided hemianopsia, and it is one of the cases which prove that the optic fibres from the right half of each retina terminate in the right cuneus and right median occipito-temporal convolution. The descending degeneration connecting these atrophied convolutions with each optic nerve also speaks strongly in favor of this anatomical connection. The lesion of the left occipital lobe did not involve these convolutions, and the patient saw things with the left half of each retina—i. e., objects on his right side. Although, to a certain extent, he had visual sensation of objects situated on his right side, yet he did not perceive them fully or recognize them; not even recognizing his food or his relatives. This failure of complete intelligent perception must have been due to the lesion on the convex surface of the left occipital lobe, and, therefore, the cortex of the convex surface of the occipital lobe seems to be essential to the complete perception and recognition of things seen, just as the cortex of the temporal lobe is essential for the recognition of spoken words.

From this case, then, it seems probable that the cuneus and the median occipito-temporal convolution is the portion of the occipital lobe where the optic fibres terminate, and is the point for simple visual sensation; while the cortex of the convex surface of the occipital lobe is the point where the visual perceptions are completely elaborated and are fully recognized. That atrophy of the cortex of the occipital lobe will produce a condition of consciousness in which things are seen to a certain extent, but are not completely recognized and understood, appears probable from those not very rare cases of progressive paralytic dementia in which, especially after apoplectiform attacks, the patient sees but does not understand what he sees.[1] Such cases have also been reported as occurring in sane persons.[2] Very few cases have been reported in which

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[1] Fürstner, Archiv für Psychiatrie und Nervenkrankheiten, Bd. 8, S. 162, und Bd. 9, S. 90. Stenger, Archiv für Psychiatrie und Nervenkrankheiten, Bd. 13, S. 218.

[2] Wilbrand, Ueber Hemianopsie.

the lesion has been strictly limited to the cortex on the convex surface of the occipital lobes, so that it is impossible yet to be certain whether such lesions cause only a loss of full perception and recognition while a certain amount of simple visual sensation remains, as in the case of Monokow; or whether there is a complete hemianopsia, as in a case (which I have not had an opportunity to read in the original) reported by Westphal,[1] but the former view seems the more probable. Whether, as is the case in both motor and sensory aphasia, the left occipital lobe is more important than the right as a centre for full visual perception, cannot as yet be decided.

From the study of hemianopsia thus far made, the following deductions may be drawn:

1st. The optic fibres from the right upper quadrant of each retina terminate in the ower half of the right cuneus.

2d. The optic fibres from the right lower quadrant of each retina terminate in the adjacent part of the right median occipito-temporal convolution.

3d. The lower half of the cuneus and the adjacent part of the median occipito-temporal convolution is the point of termination of the optic fibres from the homonymous halves of the retina; the right half of each retina being represented in the right occipital lobe, and the left half in the left lobe.

4th. On the median surface of the occipital lobe take place those actions which are associated with simple visual sensations.

5th. On the convex surface of the (left ?) occipital lobe take place those actions which are associated with complete visual perception and recognition.

Before dismissing Case I. from our consideration, there remain one or two points worthy of mention. The mental disturbance due to the failure of the patient to recognize familiar objects, which characterized the commencement of the attack, was due probably not so much to the lesion of the cuneus as to the disturbance in the circulation in the adjoining portions of the brain, especially in the rest of the cortex of the right occipital lobe, and to a less degree in the left occipital lobe also. The recurrence, seven or eight days later, of this failure to recognize objects may be explained either by his being placed in strange surroundings, or, more probably, by the circulatory disturbances taking place in the occipital lobe consequent upon the reactive inflammation surrounding the point of softening. The attacks of angina pectoris were probably due to the atrophy of the ventricular wall at or about the middle of its posterior surface, which atrophy, very likely, resembled the cortical atrophy in that it depended on embolism, or thrombosis.

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[1] Charité Annalen, 1882, p. 466.

Case II., besides being of great value in connection with the subject of hemianopsia, is also of interest in that it shows that an atrophy of the superior and middle temporal convolutions on the left side of the brain causes an inability to understand spoken words, although sounds are still heard. As a consequence of this inability to understand spoken words, the symptoms of sensory aphasia occur—*i. e.*, the patient, not understanding what is said to him, makes irrelevant remarks, and if by any chance in speaking he uses the wrong word, he cannot correct himself by the sense of hearing. Many cases have now been reported in which the inability to understand spoken words and the consequent sensory aphasia have depended on a lesion of the superior, or of the superior and the middle temporal convolutions on the left side;[1] so that we may justly conclude that the memory of spoken words depends upon the integrity of the left superior temporal convolution, and that the full perception and recognition of spoken words are associated with actions taking place in that portion of the cortex. In what portion of the temporal lobe the fibres of the auditory nerve actually terminate is not known, but that they must do so at some point other than the superior and middle convolutions is evident from the fact that when the whole temporal lobe, or the bundle of fibres which runs from the internal capsule to the temporal lobe is destroyed, there results not merely inability to understand spoken words, but complete deafness.[2]

CASE III. *Impairment of motion and sensation in right arm and leg; agraphia, alexia, and aphasia. Atrophy of lower three-quarters of posterior central convolution, and of the inferior parietal lobule of the left cerebral hemisphere.*

March 11, 1886. R. B., male, æt. sixty-six, married, lumber merchant. With the exception of an attack of pleurisy, when quite a young man, he has always enjoyed good health. He has been active and has devoted himself to business. On September 9, 1876, he was taken sick with typhoid fever, which lasted nearly six weeks, and was of moderate severity, his temperature never rising above 103° F. In the third week of this fever his family noticed one afternoon that he had suddenly lost his power of rational speech and could not make himself understood. On the arrival of the attending physician it was found that the patient had a right hemiplegia and aphasia. For some time after this the patient was slightly delirious and complained of some extra legs in bed with him, etc. After the fever ceased he remained much prostrated for a long time, and went down stairs for the first time in February, 1877. The paralysis of the right side of the body, especially of the arm, continued, and he had well-marked aphasia. Frequently at table he asked for a chicken when he wanted an egg, etc. He always knew in such cases that he had used the wrong word and recognized the right word as soon as he heard it.

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[1] Seppilli, Revist. Speriment. d. freniatre, etc., 1884, x. p. 94. Amidon, New York Med. Journal, vol, 41, pp. 113, 181.

[2] Wernicke und Friedländer, Fortschritte d. Med., 1883, No. 6; also the case of Hutin cited in Wernicke's Lehrbuch der Gehirnkrankheiten, Bd. 2, S. 180.

On July 6, 1877, he was examined by Dr. Clymer, of New York, who found: "Right hemiplegia and aphasia. In right lower limb motor power fair, sensibility impaired and perverted. In right upper extremity motor power fair in arm and forearm, but motility of hand impaired; sensibility impaired and perverted, particularly in hand; sensations retained for some minutes after impact. There is a decided tendency toward contracture in the muscles of the right hand." Dr. Clymer also states in this letter that "there is probably an irritative process going on in the brain from the symptoms complained of." On October 25, 1877, Dr. Clymer examined him again and wrote: "I found him no worse and, I think, in some respects better. He drops fewer words and uses his words more correctly. He has, he tells me, less confusion. He says he does not get strong, and there is no improvement in his right arm. His mouth, too, is badly cankered." On December 7, 1877, Dr. Clymer wrote: Mr. B. has gained in the five weeks between his visits to me very much."

In the year 1878, the patient improved steadily. He walked without limping. He was able to use his right hand in cutting his food, in eating, etc., although it was awkward. He was able to dress himself and to take care of himself, but whenever he could he used the left hand in preference to the right. But the difficulty with the right hand seemed to be awkwardness rather than weakness. He complained that his hand felt numb, and he kept rubbing and working it almost constantly. The aphasia almost entirely disappeared, so that he resumed business and travelled about a good deal and had very little difficulty in expressing himself, especially when he was interested in what he was saying and was a little excited. His principal trouble, and the one which did not improve at all, was that he could not spell, read, or write. He could not spell the simplest word, such as "cat," from memory. There was a sign opposite his house on which was the name John Kingsbury. Many times a day he would look at the sign and spell out the name, J-o-h-n K-i-n-g-s-b-u-r-y. The John he almost always got correctly, but it was rather the exception when he read all the letters of Kingsbury without a mistake. After having spelled the name John by reading it many times, he would shut his eyes and try in vain to spell from memory the name John which he had just spelled by reading it. He was entirely unable to read. He might read one, or perhaps two words correctly, but could go no further. He understood perfectly whatever was said to him. He never learned to write with his left hand. He could sign his name with his right hand if he went at it with a rush, and everything went smoothly, but if by any chance he was stopped in the middle of the name he could not finish it, not knowing what letter came next. If the next letter were told him, he might, perhaps, finish the signature. He was able to write a little if some one told him the letters of most of the words. The following are fac-similes of parts of about the only two letters that he wrote during his sickness. He frequently complained of a "dull, bad feeling in his head." At times his mind seemed clear, but at other times he seemed dull and could not clearly comprehend some simple business transaction. At one time for several months he was very despondent, and thought that he had no money and must go to the poor-house. Before his sickness he was subject to sick headaches, but they did not trouble him much during his sickness. Toward the end of the year 1878, he had a severe attack of

I went to your office this after this afternoon to see wm to wish me to go to Bleecker haven for Hunting and Stuving as it is good weather for you

I cannot think how to make letters will I ever be able to understand or ever will you will see that I cannot compose well

gall-stones which confined him to bed for several months; gall-stones being found in the feces. Subsequently he had several milder attacks. He remained pretty well till 1881, when his son died; after that time he was somewhat worse. In the summer of 1884, one very hot day, he probably had a slight sunstroke, and after that he was decidedly worse and steadily failed. His leg dragged in walking and his arm became almost useless. His mind became a little dull. He found great difficulty in expressing himself, and would work a whole day trying to frame a sentence before he could get it right and express his meaning. His articulation was distinct and he rarely showed any mental irritability.

Autopsy held forty-one hours after death. The skull-cap was rather abnormally thick and the dura mater, which presented a slightly yellowish tint at points but was otherwise normal, was excessively adherent to it. The sinuses and vessels of the pia mater contained only a small quantity of blood. The pia mater presented numerous patches of opacity following the course of the vessels, and over the whole surface of the left hemisphere there was an increased amount of sub-arachnoid fluid. This effusion was especially marked at a point a little posterior to and above the posterior termination of the fissure of Sylvius where it formed a large fluctuating bag which resembled a mass of jelly. There was a slight atrophy of all the convolutions of the left hemisphere, and beneath the point of greatest effusion mentioned above there was almost complete atrophy of the convolutions, which were represented by a thin gray fringe resembling a fold of pia mater. This atrophy involved the whole of the posterior central convolution, except a small portion of it near to the superior longitudinal fissure, the adjoining part of the superior

FIG. 3.
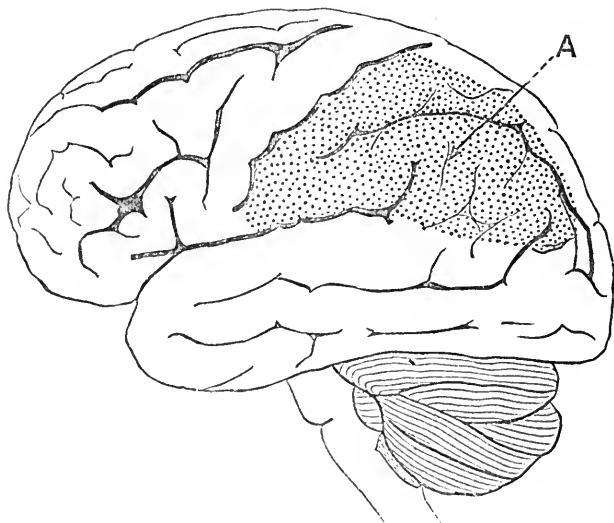
Outer aspect of left hemisphere. (Ecker.)
A, point of atrophy.

N. B.—It is to be remembered that these charts of Ecker are schematic. In this case, although the lesion is mapped out according to the convolutions affected, yet the lesion appears decidedly larger as represented on the chart than the actual lesion was on the surface of the brain.

parietal lobule, and the whole of the inferior parietal lobule, comprising the supramarginal convolution and almost the whole of the angular con-

volution. The fissure of Sylvius thus seemed to extend directly back-ward to the occipital lobe. The area of this atrophy corresponded with the area of distribution of the third (ascending parietal) and fourth (parieto-sphenoidal) branches of the middle cerebral or Sylvian artery. The white matter beneath the atrophied convolutions was neither softened nor atrophied.

The convolutions of the island of Reil, the left inferior frontal con-volution, and the white matter immediately beneath it, were entirely normal, as were, also, the convolutions of the right hemisphere. The arteries at the base of the brain, and even some of the smaller cerebral arteries, presented an extreme degree of atheromatous degeneration. The posterior communicating arteries were obliterated and resembled threads. The ventricles of the brain were normal, and no abnormal appearance was found on sections through the cerebral substance and the ganglia at the base of the brain. No descending degeneration could be discovered on macroscopic examination. No microscopic examination of the nervous tissue was made.

The other lesions found were hypertrophy and fatty degeneration of heart, thickening of mitral and aortic valves, atheroma of aorta, old double adhesive pleuritis, firm adhesions of colon to under surface of liver enclosing the gall-bladder, which presented the cicatrix of a healed perforation into the colon, and a moderate degree of interstitial neph-ritis in both kidneys.

The atrophy of the convolutions in this case and the attendant symptoms were evidently due to an embolism or thrombosis of the terminal portion of the left middle cerebral artery, which occurred in the third week of the typhoid fever.[1]

In this case the principal symptoms are impairment of motion and sensation in right arm and leg, alexia, agraphia, and aphasia; and the principal convolutions involved in the atrophy are the posterior central, except a small portion of it near the longitudinal fissure, the supramarginal convolution, and the greater part of the angular convo-lution on the left cerebral hemisphere. The lesion differs greatly from that in Case I. in that it is so extensive, and it is possible to explain the numerous symptoms which this extensive lesion produced only in the light of other cases of cerebral disease.

In the first place, the case is of interest in a negative way inasmuch as it shows that this extensive lesion caused no disturbance of sight or hearing. From Case II. we learned that the memories of things seen depended on the integrity of the convex surface of the left occipital lobe, and that the memories of spoken words depended on the integrity of the left superior temporal convolution. Case III. shows that these centres cannot encroach to any extent on the parietal lobe, as it is sometimes claimed that they do. It is, also, one of the already some-

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[1] Cases of recovery from probable occlusion of the middle cerebral artery occurring in the course of typhoid fever have been reported by Vulpian in the Revue de Médecine, 1884, p. 162; and Kühn in Deutsches Archiv f. klin. Med., Bd. 34, S. 56.

what numerous cases which show that the cortical centre for sight is not situated in the angular convolution, as Ferrier concluded it was from his experiments on apes.

The most striking and persistent symptom in this case is the inability of the patient to read or write, or the alexia and agraphia, as these disturbances are respectively called. Neither the alexia nor the agraphia was complete. The patient could read single letters and even short words with difficulty, but he could not spell the word with his eyes shut immediately after having read it. He could not store up the memory 'of the word that he had just seen, although he could store up the memory of the same word when he heard it spoken. He could not remember the appearance of words. Both the alexia and agraphia of the patient can be easily explained on the supposition that he had lost the memory of the appearance of words. When he saw a word in reading he had no already existing memory with which to compare it and he was unable, therefore, to recognize it. When he tried to write he had no memory of the appearance of the letter or word which he wished to write, and, hence, he was unable to reproduce it on paper; as he said in one of the only two letters which he wrote during his illness, "I cannot think how to make letters." The agraphia did not depend on the motor disturbance of the right hand, for in his letter of March 20 the letters were writtten legibly enough, and subsequently the awkwardness of his arm became much less.

When we consider the act of reading, and especially when we consider how a child first learns to read, it seems natural that the cortical centre for reading, or that portion of the cortex on the functional activity of which depends the memory of the appearance of written or printed words, should lie near the auditory centre and especially near the visual centre; and such is indeed the case. For in the cases of alexia and agraphia in which an autopsy has been made, the lesion has involved the angular convolution.[1] In this case, therefore, we must consider the cause of the alexia and agraphia to be the atrophy of the angular convolution of the left hemisphere, and since this atrophy did not involve the entire convolution, the alexia and agraphia were not complete although nearly so.

Another constant symptom in this case is a disturbance in the motility or an awkwardness of the right arm, and, to a less extent, of the right leg. The lesion corresponding to this disturbance must lie in the so-called motor zone, which is the portion of the cerebral cortex that has been studied with special care. As a result of extended experimental and clinical study, it may be considered established that the two central

[1] M. Allen Starr, AMERICAN JOURNAL OF THE MEDICAL SCIENCES, vol. 87, p. 389. A. B. Ball, Archives of Medicine, 1881, vol. 5, p. 136.

convolutions and the adjacent part of the cortex are the cortical centres for movements of the opposite side of the body. The centre for the leg includes the paracentral lobule, the upper third of the two central convolutions, and the greater part of the superior parietal lobule. The centre for the arm includes the posterior part of the superior frontal convolution, the middle third of the two central convolutions, and the anterior part of the inferior parietal lobule. The centre for the face includes the lower part of the central convolutions, especially the anterior one. These different centres are not sharply defined from each other; the one merges into the other; and it is rare to find a cortical lesion so situated and so small that it produces a paresis or paralysis of only one extremity or of only one-half of the face. In Case III. the lesion involves a large part of the centre for the arm, and a small part of the centre for the leg, and consequently there is much impairment of the motility of the arm and a slight impairment of that of the leg. There is no distinct statement concerning the face made in the history, although the lesion seems to involve a portion of the centre for the face.

When we examine the motor disturbance of the arm more closely, we find that it consisted in awkwardness rather than weakness, and that it was confined more particularly to the hand and fingers, or to that part of the arm with which those fine and delicate movements are executed which are the result of much education. Complicated movements which he had formerly executed easily, the patient executed with difficulty. When he tried to write he said: "I cannot think how to make the letters," and in the same way, when he tried to use his hand in other acts, he probably could not think how to make the movement. He had lost his skill in using his hand. He had forgotten the necessary feelings of muscular innervation; the memory of former innervation feelings was destroyed. In order to understand this clearly it must be remembered that one of the most important functions of the cerebral cortex is the reproduction of former perceptions in the form of memories. The cortex of the so-called motor centres is essential for the reproduction of memories of muscular innervation for movements which have previously been performed, and which can be performed again easily and readily only by the aid of the corresponding innervation memories. These memories of muscular innervation have been originally acquired, in part at least, through reflex acts.[1]

The lesion in Case III. involved only the posterior half of the centre for the arm, and the symptoms produced were those of awkwardness rather than weakness. From a consideration of the reported cases of lesions of the motor centres, it seems that lesions situated in front of the

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[1] Meynert, Psychiatry, transl. by Sachs, vol. 1, p. 160.

fissure of Rolando cause a more complete paralysis,[1] and are more often associated with descending degeneration, than lesions situated behind the fissure of Rolando, which produce rather a paresis or awkwardness.[2] It seems probable, then, that the nerve fibres for the arm and leg have their origin in that part of their respective centres which is situated in front of the fissure of Rolando, (in the case of the arm the fibres probably start from the base of the superior frontal convolution), while that portion of the centre situated behind the fissure of Rolando is essential to the production of the memories of innervation feelings.

The aphasia which was present in the early part of this case, but which later almost completely disappeared, was not due to any lesion of the left inferior frontal convolution, which is the portion of the cortex now generally regarded as essential to the production of memories of the innervation processes necessary to the pronunciation of words and hence of speech. This is one of the not very rare cases of aphasia due to a lesion which causes an interruption in the conduction along the association fibres which connect the left inferior frontal convolution either with the temporal lobe or with the angular convolution—i. e., with the cortical centres for the memory of either spoken or written words. A number of cases of aphasia dependent on lesion of the supramarginal convolution or of the white matter just below it have been published.[3] Since in this case the aphasia was temporary, it was probably due to some temporary cause, as, for instance, anæmia of the conducting fibres in the white matter beneath the supramarginal convolution, which anæmia gradually disappeared as the collateral circulation became more or less perfect. It is quite possible, too, that the aphasia was in part due to the loss of memory of the appearance of words. In the case of Cornil cited by Wernicke[4] a small lesion of the supramarginal convolution caused not only aphasia, but also hemianæsthesia; so that it might be inferred that the impairment of sensibility noted by Dr. Clymer in Case III. was due to the lesion of the supramarginal convolution. Such an inference, however, is unnecessary, for it is now well known that lesion of the so-called motor zone causes loss of sensibility, although it is not yet settled whether the cortical centre for cutaneous and muscular sensibility is limited to the motor zone or whether it includes also the parietal lobe.

From the above considerations it is evident that although in Case III.

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[1] Mickle, Journal of Mental Sciences, April, 1885; Hirschfelder, Pacific Med. and Surg. Journ., Oct. 1881; Spitz, Deutsche med. Wochenschr., April, 1882; Prévost and Cotard, Obs. 15 in Études physiol. et pathol. sur le ramolis. Cérébrale, Paris, 1886.

[2] J. Hughlings Jackson, Brain, Oct. 1882: H. B. Sands, Med. News, April, 1883; Wm. Carson, Am. Practitioner, vol. xv. p. 217; Vetter, Deutsches Archiv f. klin. Med., Bd. 22, p. 421.

[3] Broadbent, Medico-Chirurgical Trans., vols. lv. and lxi; S. West, Brit. Med. Journ., 1885, p. 1242; Cornil, Gaz. Méd., 1864, p. 534.

[4] Lehrbuch der Gehirnkrankheiten, vol. ii. p. 176.

the lesion is very extensive, yet it confirms the following deductions which can be drawn from reported cases in which the lesion was less extensive:

1st. In the anterior part of the cortical centre for the arm originate the nerve fibres for the arm, and lesions of this part cause absolute paralysis.

2d. In the posterior part of the cortical centre for the arm take place those cellular actions which are essential to the production of memories of muscular innervation, and lesions of this part cause awkward, uneducated movements.

3d. The cortical centre for muscular and cutaneous sensibility extends over the motor zone and probably over the parietal lobe also.

4th. The left angular convolution is essential for the memory of the appearance of words and lesions of it cause alexia and agraphia.

The subject of aphasia will be considered later.

In Case III. the lesion affected principally the cortical centre for the arm, while in the following case the cortical centre for the leg was alone affected.

CASE IV. *Left hemiparesis. Convulsions limited to the left side of the body always commencing in the left leg. Endothelioma pressing on right superior parietal lobule.*

M. C., female, æt. forty-two, married, a servant, entered St. Peters Hospital June 7, 1883. Family history unknown. Patient has never been very strong, but has worked hard. Four and a half years ago she slipped and fell on the sidewalk, striking on the back of her head. About three and a half years ago she had the first of a series of attacks of which she has had about a half dozen in all. These fully developed attacks commence with a tingling and twitching of the left foot which gradually extend up the leg and then commence in the left arm; next the tingling sensation creeps up the back to the left side of the head, and the head commences to twitch; after the head has continued twitching for from ten to fifteen minutes and while the whole left side of the body is twitching she loses consciousness and remains unconscious for a quarter of an hour or longer; while unconscious she frequently has involuntary micturition. The right side of the body has never taken part in these convulsions. She has never bitten her tongue, and she has never had a convulsion which did not commence in the left foot. Besides these half dozen fully developed attacks she has had more frequently attacks in which she feels a pain in the left heel, the left great toe works up and down for a long time, and sometimes the muscles of the leg twitch, but the twitching goes no further and the attack passes off. Patient also complains that the left arm and leg are much weaker than the right and that she has much darting pain in the left leg, arm, face, and left side of head. She often feels as if a strap were drawn firmly about portions of the left arm and leg, and at times it feels as if her toes had fallen off; while it feels at other times as if her teeth had fallen out. These latter sensations are most marked immediately after an attack of convulsions. She says that her eyes are so weak that

she cannot read and that she has flashes of light before her eyes which make her dizzy. She complains of fulness and pain in vertex of head, and thinks that at times she is not in her right mind.

On entrance into the hospital patient seems weak and anæmic. An examination of the thorax and abdomen reveals nothing abnormal. Sensibility intact over both sides of face, both arms, and right leg. Sensibility in left foot and leg is somewhat blunted to tactile impressions but not to painful ones. Left leg is much weaker than right, so that she is unable to walk without a cane. Left arm is weaker than right. Grasp of right hand 50, of left 40, as registered on the outer circle of Mathieu dynamometer. Ankle clonus and exaggerated knee-jerk on both sides, especially on the left. No exaggeration of tendon reflexes in arms. Pupils equal and react to light. An ophthalmoscopic examination by Dr. Merrill reveals a typical specimen of choked disk. In both eyes the veins are tortuous, the disk reddened and œdematous. In the left eye there is rather less œdema, but there is a patch of exudation in the disk and in the adjoining part of the retina. No tenderness on percussion over any part of the skull.

December 1, 1883. Since entrance into the hospital, the condition of the patient has not changed materially. She had ten fully developed unilateral convulsions between time of entrance and August 21, 1883, since which time she has had no convulsion, although she has had some abortive attacks. The unilateral convulsions which she had in the hospital have all commenced in the left foot and gradually extend up over the whole left side of the body, the right never being affected. The convulsive movements are clonic contractions of the muscles of left leg, left arm, left side of neck, left side of face, left side of tongue, and left eyelid and eyeball. Consciousness persists during the earlier part of the attack, but soon becomes more or less completely lost. Each attack can be promptly arrested by the inhalation of ether, and when so arrested does not return when the ether is withdrawn. After these attacks it has been noticed that the left side of the body is decidedly weaker than before and the strength returns slowly. Besides these attacks she has attacks of convulsions limited to the left leg. In addition to these convulsive attacks she has numerous attacks of a curious nature in which all mental action seems to be abolished. She will sit as if in a trance, perfectly motionless, unable to answer any question or to do anything that she is told, for a space varying from a few minutes to an hour or more, when she will suddenly come to herself and be entirely natural again. When she comes to herself she sometimes has no memory of anything that has happened, while at other times she has a pretty clear idea of all that took place in the room while she was in the fit. At other times, while in such a fit and incapable of answering questions, etc., she keeps repeating over and over the phrase "Lord, have mercy on me!" and in all her fits she never uses any other phrase than "Lord, have mercy on me!" She has had much pain at times in left side, especially in left side of skull, and has had several severe attacks of nausea and vomiting.

August 1, 1884. Has been more comfortable during the past eight months. Has not had more than half a dozen unilateral convulsions, and has had less pain in left side of head. Feels a little stronger and can walk a little better with the aid of a cane. No decided change is found on physical examination except that there is now at times decided

tenderness on percussing the skull over the upper posterior part of the right parietal bone, and that there is slight but evident left facial paresis which is especially well marked after a convulsive attack. The remedies which seem to benefit her the most are small doses of bromide of potassium or of chloral.

October 30. Slowly failing during past few days. To-day lies in a semi-comatose state, with the head, but not the eyes, turned toward the right. She answers questions in monosyllables. Tongue protruded fairly straight. She cannot move either left arm or leg, which are flexed and moderately rigid.

November 1. This evening the pupil of the right eye was contracted and did not respond to light, while the pupil of the left eye was dilated and did respond to light. Temperature $106\frac{1}{2}°$ F. All these symptoms disappeared in a few hours and did not recur.

3d. Entirely comatose. Left side of body completely relaxed. Some resistance offered to passive motion on right side. Eyes examined by Dr. Merrill, with the following results: Outlines of nerves are indistinct, arteries small; both arteries and veins are very tortuous. Retinæ in the neighborhood of the nerves and extending well out toward the periphery are œdematous, and present an unusually opaque appearance. The appearance of both eyes is much alike, except that in the left eye the arteries and veins are much smaller and more tortuous.

4th. Patient died to-day. *Autopsy* held five hours after death. Skull cap unusually dense and not symmetrical, being unusually hollowed out at a point near the right parietal eminence. Dura mater not so adherent to skull cap as usual; inner surface of dura mater normal. Pia mater normal except for much congestion of both the larger and smaller veins. Base of brain normal. Cerebral convolutions are generally flattened. Lying close against the superior longitudinal sinus and just posterior to the upper extremity of the posterior central convolution on the right side is a hard ovoid tumor, measuring one and one-half inches in its longer, and one and one-quarter inches in its shorter

Fig. 4.
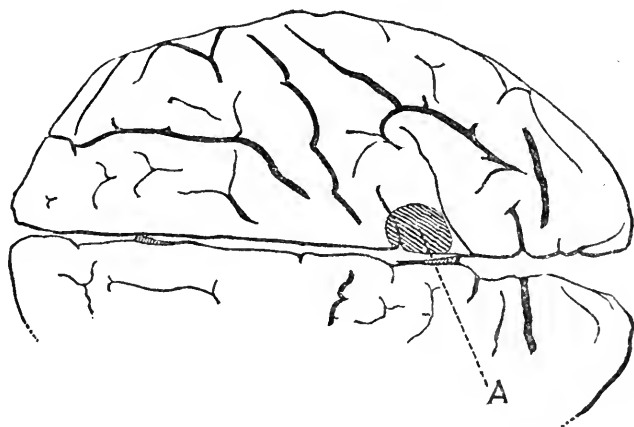
Superior surface of right hemisphere, after Ecker.
A, depression caused by tumor.

diameter. The tumor pressed on the cerebral substance, causing a rather deep concavity in the most anterior part of the right superior parietal

lobule on the very edge of the superior longitudinal fissure. The tumor is firmly adherent to the dura mater and around its periphery the dura mater, the pia mater, and the cerebral cortex are all firmly adherent to the tumor and to each other. Just beneath the tumor the cerebral substance is slightly softened. The left lateral ventricle is dilated in all its parts, while the right lateral ventricle is rather smaller than normal, and its posterior horn is almost completely obliterated. Sections through the brain and spinal cord show no other lesions.

On microscopical examination the tumor was found to be an endothelioma. It presented a well-marked alveolar structure, and the cells were flat and had a concentric arrangement. No descending degeneration could be found either in the spinal cord or in the pyramidal tract at the base of the brain.

In the first three cases the lesion was a cerebral atrophy which simply put certain portions of the brain out of action. In Case IV., however, the lesion is a tumor which, in its growth, pressed upon and irritated the cerebral cortex and the cerebral meninges, and consequently in this case we get for the first time symptoms of cerebral irritation—i. e., nausea and vomiting, and pain and convulsions limited to the opposite side of the body. In this case the tumor never actually destroyed the cerebral cortex, and, therefore, the symptoms of irritation were never completely replaced by those of paralysis, although toward the end of the patient's life the convulsions became rarer and the hemiparesis became more decided.

The principal symptoms in the case were the pain, the convulsive attacks, and the attacks in which the patient was unable to answer questions or to perform any other voluntary action. It has long been known that the nearer a tumor is to the surface of the cerebral hemispheres the greater is the pain that it causes, and this tumor growing in the meninges caused paroxysmal attacks of intense pain throughout the left side of the body, and was especially constant and severe over the whole left side of the head. The distribution of the pain is difficult of explanation. The most reasonable supposition is that it was due to irritation of the cortical termination of the sensory nerves of the left side of the body, especially of the fifth nerve; and yet, according to our present views of cerebral localization, the fibres from the fifth nerve terminate in the lower rather than in the upper part of the central convolutions. It was only toward the end of life that there were pain and tenderness over the seat of the tumor.

Unilateral convulsions have been very frequently noticed in cases of tumors and other irritative lesions of the cerebral cortex. Such convulsions are sometimes called cortical epilepsy or Jacksonian epilepsy, after J. Hughlings Jackson, who has long given them especial attention and study, and who insists on the importance of the temporary paresis following the convulsion and limited to the muscles taking part in the

convulsion, which temporary paresis was well marked in Case IV. It is customary in these cases for the convulsion to commence in that part of the body which is connected with that portion of the cortex in which the lesion is situated, and, accordingly, in this case the convulsive movements always began in the left foot; the tumor lying in the cortical centre for the left leg. In many cases the convulsion, although commencing on one side, soon becomes general and is associated with loss of consciousness, thus closely simulating epilepsy. It is such cases which have given much support to the theory of the cortical origin of epilepsy, which has now replaced the vasomotor theory of epilepsy; although true epilepsy is entirely distinct from such epileptiform convulsions dependent on gross disease of the brain. In Case IV. the convulsions were never general, and the loss of consciousness was often incomplete.

Besides the unilateral convulsions, the patient had another form of attack which is very interesting, and which has never to my knowledge been noticed in cases of cerebral tumor. In the attacks of this kind consciousness, although obscured, was rarely or never completely lost. The patient was in a kind of trance; she knew what was going on about her and tried to answer questions and to do what she was told, but there seemed to be an inhibition put upon all action. The most she could do in the milder attacks was to say "Lord, have mercy on me." These attacks in many respects resembled the attacks of petit mal of epileptics. We know that from the motor area of the cortex two kinds of impulses originate and pass down along the pyramidal tract to the sub-cortical centres. One kind of these impulses sets the sub-cortical centres in activity and causes movements; the other kind stops the activity of the sub-cortical centres and inhibits movement. Destructive lesions, either of the motor area in the cortex or of the pyramidal tract, destroy voluntary movements, and, at the same time, by destroying inhibition, increase reflex movements. In Case IV. it seems that the irritation of the tumor caused at one time a discharge of motor impulses which set the sub-cortical centres into activity and produced the convulsive movements, and at another time caused a discharge of inhibitory impulses which repressed all activity of the sub-cortical centres and prevented movement. It seems then as though the two contradictory forms of activity which this portion of the cortex manifests in health, and which cause respectively movement and inhibition, were both reproduced in an abnormal discharging manner by the irritation of the growing tumor.

Besides these symptoms, there was in this case a left hemiparesis which was always more decided immediately after a convulsion, and which was due in part, perhaps, to the left-sided convulsions, but certainly in greater part to the direct pressure of the tumor upon the cortex. Although the action of the tumor was confined to the cortical centre for the leg, yet the paresis was not confined to the leg, but affected

also the arm and face to a less degree. This would indicate that in each cortical motor centre the face, arm, and leg are all represented to a varying degree, and that there is no sharp line to be drawn between the centres. This and many other cases can be better explained in this way than by the supposition of transmitted pressure. Certainly it is very rare to find a cortical lesion so small that it causes disturbance in only one member.

In all the cases so far reported in this article the lesion has been confined to the cortex of the posterior part of the brain and has in no instance extended in front of the fissure of Rolando. I have not had any case in which the cortex of the frontal lobe was involved, but I will report briefly three cases in which the lesion involved the white matter of the frontal lobe.

CASE V. *No symptoms, coma; tumor of frontal lobe.*—W. Mc. P., male, æt. forty-four, widower. Always healthy. Infected with syphilis eight years ago. During the past year and a half he has been troubled by a varicose vein in his leg which has ruptured four times, causing a great loss of blood each time. Otherwise he has felt well except that he has felt weak of late, on which account he entered the hospital. On entrance he exhibited anæmia and general weakness, which were attributed to the excessive loss of blood. No paralysis of motion or sensation and no aphasia could be discovered. Eyes were not examined. Four days later he became comatose and the next day he died. At the autopsy a tumor as large as a small hen's egg was found in the lower part of the right frontal lobe near its middle, surrounded by a narrow zone of yellow softening. Tumor was dense, mahogany-colored on section, subdivided by indistinct septa and contained several distinct hemorrhages.

CASE VI. *Convulsions, aphasia, somnolence, coma, death; abscess just anterior to left corpus striatum.*—H. T., male, æt. forty-three, married. Enjoyed good health until one day when, without any warning, he had a severe convulsion followed by unconsciousness for about an hour, when he had a second convulsion which was also followed by unconsciousness for an hour, after which he recognized persons about him and appeared well. During the next fortnight he went out, but seemed averse to bodily or mental exertion. He grew more and more listless and dispirited. He complained of paroxysmal pain in his left eye and darting through his temples. There was no paralysis of any sort, but there was a slight degree of aphasia. His pulse did not vary much from 80. He steadily grew more and more drowsy, became comatose, and died just one month after his first convulsion. At the autopsy two encapsulated abscesses, each the size of a small hen's egg, and communicating with each other, were found a little in front of the left corpus striatum; the top of the upper abscess being on a level with the floor of the lateral ventricle. The cerebral substance in the immediate neighborhood of the abscess was the seat of a softening which involved the anterior part of the corpus striatum and the convolutions of the island of Reil.

CASE VII. *Convulsions, aphasia, paralysis of leg, somnolence, death; tumor involving the whole of the medullary substance of the left frontal*

lobe.—M. D., female, æt. thirty-nine, married, always enjoyed good health till one day when, without known cause, she was seized with three epileptoid convulsions in succession, after which she remained comatose for a few hours, and then seemed to be perfectly well again. These attacks occurred on the same day that her menstrual discharge ceased. One month later, on the last day of her menstruation, she had another set of altogether similar convulsions, and still again, one month later, the attacks recurred   Just before the termination of the next menstruation twenty leeches were applied to the inside of the thighs, and a brisk cathartic was administered with the result that the convulsions did not appear till two weeks later. After this they continued to appear at irregular intervals which were seldom less than four weeks. Except for the convulsions she continued in fair health for five months, when she began to complain of paroxysmal pain in both temples, especially in the left one, and became listless and dispirited, and had also severe attacks of vomiting. Three months later the right leg became so weak that she could not walk, and her eyesight began to fail. Eyes were not examined ophthalmoscopically. She became more and more listless and developed well-marked aphasia. Ten months after her first convulsion she had a severe convulsion, after which she remained unconscious, and vomited constantly. The right side remained nearly motionless, while the left arm and leg were in continual motion. On the morning of the next day she died.   At the autopsy a gelatinous tumor was found occupying the place of the whole of the medullary substance of the left anterior lobe. The tumor cut tough and gave the sensation as though the scalpel was drawn over wool. It reached to within half an inch of the surface of the hemisphere. The cerebral substance around it was softened ; the corpus striatum being involved in the softening.

Case V. shows that a large tumor may exist in the frontal lobe without giving rise to any symptom until it causes coma and death. Numerous cases are on record which prove the same thing, and it is now generally accepted that lesions of the frontal lobe may cause no characteristic symptoms (except perhaps an ill-defined change in the character and disposition of the patient) unless they are so far back that they involve the motor centres, or unless they involve the posterior part of the left inferior frontal convolution, in which case they produce aphasia. It is well known that in the left inferior frontal convolution take place those cellular actions which are essential to the production of the innervation feelings necessary for speech, and lesions of this convolution produce motor aphasia—*i. e.,* the more or less complete inability to speak, just as lesions of the left superior temporal convolution causes sensory aphasia— *i. e.,* the inability to understand spoken words, and hence irrelevant speech. In Case VI. the softening about the abscess involved either the left inferior frontal convolution or the fibres coming from it, and produced a slight degree of aphasia ; while the extensive lesion in Case VII. involved not only the fibres from the inferior frontal convolution but also some of those from the central convolutions, and produced not only well-marked aphasia but also paralysis of the right leg.

Cases VI. and VII. are good examples of general convulsions depend-

ing on tumors of the anterior lobes, just as Case IV. was a good example of localized convulsions dependent on a tumor located in the motor region of the cortex. The fact that the cessation of menstruation acted as an exciting cause for the convulsion in Case VII. and that a free bleeding at that time delayed the appearance of the convulsion is very interesting.

From this study of cerebral localization, the following conclusions may be drawn:

1st. The greater part of the cerebral cortex can be divided into small areas, each of which is functionally associated with a definite mode of mental action, and is consequently called the cortical centre for that action.

2d. The cortical centres connected with the sensory nerves are situated in the posterior half of the cerebral cortex including the temporal lobe; and the cortical centres connected with the motor nerves are situated in the middle portion of the cerebral cortex and in the posterior part of the cortex of the anterior lobe.

3d. Each sensory cortical centre probably consists of two parts; a smaller one in which the peripheral nerve has its final termination and in which take place those molecular changes which correspond to simple sensation; and a larger one in which take place those molecular changes which correspond to the mental processes of memory, judgment, and comparison which together constitute complete perception and recognition.

4th. Each motor cortical centre probably consists of two parts: a smaller one in which the peripheral motor nerve has its origin, and in which take place those molecular changes which correspond to the action of the will in originating voluntary movements; and a larger part in which take place those molecular changes which correspond to the memories of coördinated muscular innervation which are factors in the production of voluntary movements.

5th. The optic fibres from the right upper quadrant of each retina terminate in the lower half of the right cuneus. (See Case I.)

6th. The optic fibres from the right lower quadrant of each retina terminate in the adjacent part of the right median occipito-temporal convolution. (See remarks on Case I.)

7th. The lower half of the cuneus and the adjacent part of the median occipito-temporal convolution is the point of termination of the optic fibres from homonymous halves of the retinæ: the right half of each retina being represented in the right occipital lobe and the left half in the left lobe. (See remarks on Case I.)

8th. Functional activity of the cortex of the median surface of the occipital lobe is necessary for simple visual sensation. (See remarks on Case II.)

9th. Functional activity of the cortex of the convex surface of the left

occipital lobe is necessary for full visual perception and recognition and for the production of visual memories. (See remarks on Case II.)

10th. The temporal lobe is the cortical centre for hearing and complete destruction of a temporal lobe or of the auditory fibres running to it causes complete deafness of the opposite ear. (See remarks on Case II.)

11th. Functional activity of the cortex of the left superior temporal convolution is necessary for the perception and recognition of spoken words and for the production of the memory of these words; lesions of this part causing inability to understand spoken words and sensory aphasia. (See remarks on Case II.)

12th. Functional activity of the cortex of the left angular convolution is necessary for the production of memories of the appearance of written or printed words; lesions of it causing alexia and agraphia. (See Case III.)

13th. Only in virtue of the fact that on its functional activity depends the production of the memories of the appearance of written or printed words can the angular convolution be considered as forming part of the visual centre. It does not constitute the visual centre, as Ferrier claims. (See remarks on Case III.)

14th. The cortical centre for the leg includes the paracentral lobule, the upper third of the two central convolutions, and the greater part of the superior parietal lobule. (See Case IV. and remarks on Case III.)

15th. The cortical centre for the arm includes the posterior part of the superior frontal convolution, the middle third of the two central convolutions, and the anterior part of the inferior parietal lobule. (See Case III. and the remarks on it.)

16th. The cortical centre for the face includes the lower third of the two central convolutions, especially the anterior one. (See remarks on Case III.)

17th. In the anterior part of the cortical centre for the arm originate the nerve fibres for the arm, and lesions of this part cause absolute paralysis of the arm. The same thing is probably true in the case of the cortical centres for the leg and face. (See remarks on Case III.)

18th. In the posterior part of the cortical centre for the arm take place those molecular changes which are necessary for the production of memories of coördinated muscular innervation. The same thing is probably true in the case of the cortical centres for the leg and face. (See Case III. and the remarks on it.)

19th. No sharp line can be drawn between the motor centres of the leg, arm, and face of the same side, and it is very possible that in each centre all three parts may be more or less completely represented. (See remarks on Case IV.)

20th. The cortical centres for muscular and cutaneous sensibility are

the same as those for motility, and probably extend backward beyond the latter over the parietal lobe also. (See remarks on Case III.)

21st. The faculty of speech cannot be located in any one portion of the cortex, and aphasia can be produced by a lesion situated in various parts of the left cerebral hemisphere; the right hemisphere apparently not being concerned in the production of speech except in the case of left-handed persons. The memories of the muscular innervation feelings necessary to produce spoken words depend on the functional activity of the cortex of the left inferior frontal convolution. The memories of the sound of spoken words depend on the functional activity of the cortex of the left superior temporal convolution. The memories of the appearance of written or printed words depend on the functional activity of the left angular convolution. These centres are all connected together by means of association fibres. The faculty of speech in its completeness depends on the integrity of all these parts, except, perhaps, that of the angular convolution. According as one or the other of these parts is affected, the symptoms of one or the other of the principal varieties of aphasia are produced. Motor aphasia is due to a lesion of the left inferior frontal convolution or of the white matter immediately beneath it. (See Cases VI. and VII.) Sensory aphasia is due to a lesion of the left superior temporal convolution (see Case II.), perhaps also to a lesion of the left angular convolution (see Case III.). Conduction aphasia is due to a lesion of the association fibres mentioned above. (See remarks on Case III.)

22d. Tumors or other irritative lesions situated in the non-motor region of the cerebral hemispheres can cause general convulsions associated with loss of consciousness. (See Cases VI. and VII.)

23d. Tumors or other irritative lesions situated in the cortical centres for the leg, arm, or face, may cause convulsions commencing in the leg, arm, or face, respectively, and which may become general, though they more frequently remain unilateral, and which are sometimes associated with loss of consciousness and sometimes not. (See Case IV.)

24th. Tumors situated in the cortical centre for the leg may produce a trance-like condition, or conditions resembling the attacks of petit mal of epileptics. (See Case IV.)

REVIEWS.

SURGICAL DISEASES OF THE KIDNEY. By HENRY MORRIS, M.A., M.B., F.R.C.S., Surgeon to and Lecturer on Surgery at the Middlesex Hospital, London. 12mo. 555 pages, with 6 chromo-lithographic plates and 40 engravings. London: Cassell & Co. Philadelphia: Lea Brothers & Co., 1886.

THIS work is one of the excellent "Manuals" which have been published during the past year or so, and is designed to furnish a comprehensive treatise upon the surgical diseases of the kidney, at a reasonable price. We especially commend the publishers for their praiseworthy effort to furnish standard medical literature at such rates as shall be within the reach of practitioners of modest incomes; and we think the effort has succeeded, not only in regard to the character of the contents, but in the mechanical execution as well.

The present work is written by Mr. Henry Morris, a surgeon who has achieved marked distinction in renal surgery. This manual is very comprehensive. After a short description of the regional anatomy of the kidney, and of the surface-markings corresponding to it, the author devotes very interesting chapters to the misplacements and malformations of the organ, many of which conditions are admirably illustrated by cuts. A distinction is made between movable and floating kidneys, which is not usually borne in mind. "A kidney is 'movable' when, though appreciably mobile to a greater or less extent, it is situated entirely behind the peritoneum. It is 'floating' when the peritoneum so completely envelops it as to form a mesonephron." As, however, a movable kidney may enjoy as great a latitude of motion as a floating kidney, it is evident that the terms are more anatomical than clinical, but the recognition of the separate conditions is of importance when operations are contemplated upon this organ. "The usual subjective symptoms of movable kidney are pain, sense of dragging weight in the abdomen, sickness, loss of appetite and other symptoms of dyspepsia, irregularity of the bowels, and possibly, though not probably, some disturbance of the urinary organs," and when these symptoms are reinforced by the physical signs of a movable abdominal tumor, of a more or less characteristic renal contour, which can often be made to return to its normal position by pressure, the diagnosis is reasonably safe; but there are other conditions which may be mistaken for a displacement of the kidney, as tumors of the omentum, pancreas, and mesentery, distention of the gall-bladder, and ovarian cystomata with long pedicles.

Another affection for which a wandering kidney has been mistaken, seems to have been overlooked by the author, viz., carcinoma of the pylorus.

A remarkable instance in which Prof. Billroth mistook a movable kidney for a pyloric cancer, is related by himself in *Wien. med. Wochenschrift*, 1884. A woman twenty-eight years of age had had progressively increasing dyspepsia for three years, until she became emaciated and very weak, and vomited incessantly, and a tumor tender upon pressure was felt in the region of the pylorus. On August 17, 1881, the operation for removal of the pylorus was begun, but when the abdomen was opened, the digestive organs were found to be healthy, and the right kidney displaced. On the other hand, Lauenstein (*Arkiv f. klin. Chirurg.*, vol. xxviii.) performed laparotomy for the removal of a supposed wandering kidney and found he had to deal with a cicatricial contraction of the pylorus. These and other errors in diagnosis make it important to be prepared for any emergency, when operations upon the kidney are undertaken. The treatment of movable kidney is generally palliative and hygienic, but if threatening symptoms occur, nephrorrhaphy or the suturing of the organ to the abdominal wall, and nephrectomy are the alternatives. The first operation should be tried before removal of the kidney is performed.

The author calls attention to the importance of bearing in mind the fact that only one kidney may exist, as operations have been performed for the removal of this organ, and at the autopsy it was found that there had been but one kidney. Single kidneys are divided into three varieties: A. Unsymmetrical kidney—*i. e.*, entire absence of one kidney. B. Atrophy, including congenital atrophy. C. Solitary kidney—*i. e.*, fusion of the two kidneys into one mass, and including horseshoe kidney. It is hard to see any necessity for these terms, and they are confusing. It seems to us it would have been better to call the "unsymmetrical" kidney, simply "single," and the "solitary," "fused," and then the name would have more closely described the condition. Under the head of absence of both kidneys is mentioned a case reported by M. Moulon, of Trieste, in which a girl of fourteen died of gastroenteritis, and at the autopsy neither kidneys, ureters, nor bladder were found. The girl urinated from the umbilicus, and it is probable that the urinary products were excreted by the liver, and carried by the umbilical vein to the umbilicus, which was located at the mons veneris. It is difficult to believe this account, but it is related circumstantially and seems to have been carefully observed and investigated. Almost equally incredible is the case reported by Vieusseux, of Geneva, in which there was suppression of urine for seventeen months, with reëstablishment of the renal function at the end of that time.

About one hundred pages are devoted to the consideration of injuries and wounds of the kidney, and the subject is handled in a thorough manner. It is well to remember that the kidney may be contused or ruptured without external lesion, and, according to our author, subparietal rupture is by no means unfrequent as the result of falls, crushes, or direct violence. In such cases the diagnosis is frequently very difficult, as there are no constant symptoms by which the lesion may be distinguished. Hæmaturia is the most characteristic sign of ruptured kidney, but it is not pathognomonic of this injury, and there may be rupture or laceration of the kidney without any bloody urine, owing to the plugging of the ureter with a clot. Contrary to what one would expect, there may be extensive rupture of the kidney without any

extravasation of urine into the tissues, provided the pelvis and calices are not torn; when this accident happens, urine will escape.

Mr. Morris, after laying down a rational mode of treatment of ruptured kidney—rest, the use of astringents to control bleeding, ice, and the cold coil—makes a suggestion to perform lumbar nephrectomy when there is "profuse and continuous hæmaturia, especially if the bleeding is rapid and arterial." The subjects of perinephritis, hydro- and pyonephrosis are treated of at length. Especial attention is called to the attitude assumed by patients suffering from perinephritis, the thigh of the affected side being somewhat flexed, and the body bent forward and inclined toward the same side, simulating quite closely hip disease in its earliest stages. It is to be distinguished from coxalgia by the unrestricted mobility of the hip, as well as by the presence of the signs characteristic of perinephritis. Such a case came under our notice recently, where, from a slight injury to the lumbar region, the patient experienced pain above the iliac crest, and for a long time walked in the above mentioned manner. There was, however, normal mobility of the hip-joint, and an entire absence of pain, tenderness, or swelling in the gluteal region. "Hydronephrosis is the term applied to overdistention of the kidney with urine. It is a mechanical result of obstruction to the outflow of urine from the kidney, no matter whether the cause be situated in the urethra, bladder, or ureter." The treatment is purely surgical. Aspiration or tapping may be first tried, and, if unsuccessful, nephrotomy and drainage. Nephrectomy can only be thought of as a last resort, when the patient's life is endangered by a continuance of the affection. Pyonephrosis is stated to be mechanical obstruction, plus pyelitis, and is frequently due to blocking of the renal pelvis with a calculus.

The author condemns the term "surgical kidney" as being unscientific and misleading, whilst suppurative pyelonephritis accurately describes the pathological lesions found in such cases. It is impossible to do more than notice a few of the good features of this work, and we have not discovered any that are bad. In regard to the prevention of "urinary fever," the caution is given, never to explore the bladder for the first time without some previous preparation of the patient, such as several days' rest in bed, regulation of the bowels and diet, and, if any malarial poisoning is probable, the use of quinine. Just previous to the introduction of an instrument, a subcutaneous injection of morphine, or five to twenty grains of quinia should be given, and in highly nervous persons the examination should be conducted during anæsthesia. These facts are well known to surgeons, but bear repeating.

Chapter XXIX. is devoted to renal calculus, a subject with which Mr. Morris's name is closely associated. Whilst stone in the kidney of sufficient size to produce serious symptoms is rare, physicians should be on the alert to detect such concretions before the organ has become disintegrated, since such conditions are now accessible to operative procedures. The most frequent signs of renal calculus are, pain in the back, usually aggravated by motion or sudden shocks; often severe colicky pains; and sometimes vomiting. The urine, also, usually at some period contains blood, pus, or albumen; pain reflected along the groin and into the testicle may also be felt; and the calls to empty the bladder are more numerous than normal. The surgical treatment of this condition is thus tersely summed up by the author:

"Nephrolithotomy, therefore, is the operation for stone in the kidney. Nephrotomy is the operation for calculous pyelitis, or calculous hydronephrosis or pyonephrosis." Nephrectomy "should never be undertaken until after the kidney has been thoroughly explored, not only with the finger and exploring needle, but also by incision of the calices of the kidney and a digital examination of the interior of the renal cavity. But if a stone cannot be detected by these means, and yet symptoms point definitely to the presence of one, and the patient's life is useless or insufferable from the pain or hemorrhage, it would be right and wise to perform nephrectomy."

These statements have almost the force of aphorisms, and can scarcely be improved upon by more wordy directions.

Tumors of the kidney are sufficiently but not exhaustively dealt with, and valuable remarks are made in regard to their diagnosis from other abdominal growths. We have no desire to be captious in regard to any slight defect in such a valuable work, but we think that a few more details in regard to the indications for treatment of renal tumors might have added to the completeness of this section. Any one who seeks information upon the subject of this treatment of solid renal tumors must satisfy himself with the following dictum: The treatment "can only be palliative in the middle and later periods of the disease. In the very early stages, could the growth be recognized, then nephrectomy would seem to offer a prospect of postponing the fatal result, perhaps even of considerably prolonging life, and in exceptional cases of securing permanent immunity." This refers only to malignant tumors, and the treatment of benign tumors is entirely omitted.

In a valuable article published in this journal in July, 1885, S. W. Gross formulates the following propositions: "That primary extirpation of the kidney is indicated, first in sarcoma of adult subjects; secondly, in benign neoplasms at any age;" and "that nephrectomy is absolutely contraindicated, first in sarcoma of children, secondly in carcinoma at any age, unless, perhaps, the disease can be diagnosticated and removed at an early stage." The last chapter is devoted to operations on the kidney, which, exclusive of aspiration and tapping with a trocar, are at present only four in number; nephrotomy or the incision into the kidney; nephrorrhaphy, or the suturing of the kidney to the abdominal parietes; nephrolithotomy, or the removal of a calculus from the kidney; and nephrectomy, or total extirpation of the organ.

These operations have all been performed sufficiently often to give them the position of recognized surgical procedures. Simple nephrotomy is the operation for relief of cystic conditions of the kidney, such as hydronephrosis, pyonephrosis, hydatid cysts, abscess, and pyelitis. In such conditions incision of the kidney should always precede extirpation, since the mortality of nephrotomy, in suppuration of the kidney, according to Gross, is but 23.65 per cent., whilst that of nephrectomy in the same affection is 43.97 per cent. Nephrorrhaphy is an operation designed to attach a movable kidney to the posterior abdominal wall. It was originated by Hahn, of Berlin, and has been performed a number of times with fair success. Morris says it has been done but eight or nine times, but with almost universally good results. Gross says it has been practised eighteen times, with one death, and that it fails to retain the organ in its position in nearly one-half of all the cases operated on. Billroth also speaks discouragingly of the operation, and says: "Unfortunately, the efforts of Hahn, of Berlin, at fixation, have had no lasting

good results." This operation should always be performed for painful floating kidney before the more serious method of nephrectomy is undertaken.

Nephrolithotomy, or the removal of a calculus from the kidney, was performed for the first time by the author in 1880, and has since been done twenty-one times, according to Gross, with two deaths, or 9.52 per cent. Twenty-four exploratory operations have also been performed where no stone was found, and the patients all recovered; hence, when symptoms of calculus are present, and the life of the patient is rendered miserable, an operation should be undertaken for the removal of the concretion, and the organ should only be removed when it is entirely disorganized, or when the stone cannot be detected, and the patient's life is endangered. The kidney was first removed by Dr. E. B. Walcott, of Milwaukee, through a mistaken diagnosis; but to Simon, of Heidelberg, is the credit due of first intentionally extirpating the kidney, and, as stated by Professor Billroth, "it must always be considered a fortunate circumstance that the first extirpation of the human kidney succeeded." He evidently did not know that the viscus had been thrice removed previously, with fatal results, as is shown by Dr. R. P. Harris's statistics in this journal in July, 1882. It is, however, fortunate that the first planned nephrectomy terminated favorably, as the justifiability of the operation was at once established.

The mortality of nephrectomy varies with the affection for which it is performed, but the combined mortality, as is shown by the statistics of several authors, does not vary much. Thus Harris, in 1882, gives the mortality at 45 per cent.; Billroth, in 1884, from larger statistics, makes the death-rate 47 per cent.; and Gross, in 1885, having collected 233 nephrectomies, finds the mortality to be 44.63 per cent. Of the two methods of performing nephrectomy, the lumbar and the abdominal, the former should always be performed when possible, as the mortality is very much less. Mr. Morris says: "Though in some cases from the size of the tumor the abdominal operation is easier, and therefore safer, the lumbar method is, as a rule, much safer, and to be preferred in all cases where the kidney is not greatly enlarged, where the tumor can be reduced by puncture, and when the loin space is not too much contracted."

For the benefit of any one who may be ambitious to extirpate a kidney, we append a few additional remarks of the author. He says:

"But here I would emphatically endorse the teaching of Simon, who laid it down as a cardinal principle that extirpation of a kidney is only permissible when a patient's life is seriously threatened by disease, and all other remedies have failed, because renal disease is more dangerous in persons with only one kidney. The suffering caused by a floating kidney ought therefore to be quite unrelievable by other means before the patient is exposed to the great risks, operative and prospective, of nephrectomy; and in renal calculus no pains should be spared to procure relief by nephrolithotomy before proceeding to the much graver operation of excision."

It must also be remembered that every effort must be made to determine the condition of the opposite kidney, and, in fact, to ascertain its presence before extirpation is performed. The case of Dr. Polk, of New York, where, after removal of a floating kidney, the patient succumbed, and the autopsy revealed the fact that she had had a solitary kidney, is an illustration of this point.

We are admonished, however, that we are not writing an essay upon renal surgery, but are reviewing a most interesting and instructive work upon this subject. We are sure that no words of ours can commend the book more than the summary of its contents and the extracts from its pages which have been made. Besides the pleasure we have had in reviewing an excellent work upon a most important subject, we have had an additional gratification in noting the many references to the work of American surgeons. The article upon renal operations may be read advantageously in connection with Dr. Harris's "Analytical Examination of One Hundred Cases of Extirpation of the Kidney," published in this journal in July, 1882; with Professor Billroth's lecture on "Extirpation of the Kidneys," in the *Wiener medicinische Wochenschrift*, Nos. 23, 24, and 25, 1884; and with Prof. S. W. Gross's valuable article in this journal of July, 1885, entitled, "Nephrectomy: Its Indications and Contraindications."   R. W.

A System of Practical Medicine by American Authors. Edited by William Pepper, M.D., LL.D., Provost and Professor of Medicine in the University of Pennsylvania. Volume IV. Diseases of the Genito-urinary and Cutaneous Systems, Medical Ophthalmology, and Otology. Pp. 877. Volume V. Diseases of the Nervous System. Pp. 1326. Philadelphia: Lea Brothers & Co. London: Cassell & Co., 1886.

Volume IV. is largely devoted to special subjects, and the contributors to it rank among the best known American specialists. In the section on "Diseases of the Kidneys," with which the volume opens, Dr. Edes, of Boston (now of Washington), contributes an important group of articles on "Floating Kidney," "Polyuria," "Albuminuria," and "Affections of the Pelvis. On the question of a "physiological albuminuria," about which we have heard so much of late years, Dr. Edes gives a very guarded opinion. We should have preferred a fuller discussion of this most important point, which is of such practical interest to physicians in life insurance work. Perhaps it is safer to say, in our present knowledge, "that the presence of albumen in the urine in sufficient quantity to be detected by the use of the ordinary tests is a decidedly serious symptom," though Leube, Fürbringer, Moxon, and others have maintained that the occasional occurrence may not be of much moment. In the consideration of the affections of the pelvis of the kidney, the indications for surgical interference are very carefully discussed from a medical point of view. Surgeons will find in these sections much of interest and value on the subject of diagnosis.

In a short and concise article, Dr. Delafield considers the important subject of Bright's disease, which he classifies into *acute and chronic parenchymatous nephritis*, and *acute and chronic diffuse nephritis*, admitting, however, that from a clinical standpoint nearly all the cases may be arranged into the two classes of *acute* and *chronic*. In the acute and chronic parenchymatous nephritis the tubules only are involved, while in the diffuse form the stroma and bloodvessels are also affected. Very few writers now recognize a pure chronic parenchymatous nephritis

without changes in the connective tissue or vessels. It is not common, and anatomically is a form of the large white kidney. Histological examination alone could distinguish it from instances of the chronic diffuse inflammation. Under chronic diffuse nephritis, Dr. Delafield describes the atrophied or cirrhotic and the so-called large white kidney, of which he recognizes three varieties: the simple large white, the waxy large white, and the large white of cardiac disease. With marked differences in the gross appearances, the minute lesions are essentially the same. We know of no author so positive as to the essential unity of the forms of chronic diffuse nephritis. He says: "After separating the true cases of chronic parenchymatous nephritis—cases in which only the epithelium of the tubes and of the Malpighian capsules is changed— all other kidneys of chronic Bright's disease present essentially the same lesions, and give rise to the same symptoms. We can often tell, during the life of the patient, whether he has large white, or atrophied, or waxy kidneys; but in many cases such a diagnosis is impossible." Dr. Delafield has been a most painstaking student of the morbid anatomy of Bright's disease, and his views on this matter are entitled to a very careful consideration. The clinical picture which he gives of the various forms of chronic diffuse nephritis is clear and truthful.

The subjects of "Hæmaturia, or Hæmoglobinuria and Chyluria," are considered by Dr. Tyson. Both are rare conditions in the Northern States, but common enough in the South. There is an accurate description of the various forms of malarial hæmaturia. In the doubtful cases of this nature which occur in the Northern latitudes the presence or absence in the blood of the bodies described by Laveran as characteristic of malaria will be useful in determining the diagnosis. Possibly also certain of the cases may be due to the Filaria sanguinis. In connection with that most obscure disease, chyluria, so many cases of which in tropical countries are parasitic, the discovery of the filaria in the blood in this country by Dr. Guitèras, of Charleston, lends additional interest. Dr. Guitèras's observations have been published since this volume was issued and they should stimulate physicians to make a most careful examination of the blood in all such cases. Dr. Tyson very rightly holds that there is also a non-parasitic form of the disease.

Articles on "Diseases of the Bladder," by Dr. E. L. Keyes, of New York, and on "Seminal Incontinence," by Dr. S. W. Gross, of Philadelphia, will afford the busy practitioner much practical information in a concise form.

Almost one-half of this volume is devoted to chapters on the "Diseases of Women," fourteen in all, which together form an admirable manual of gynecology. The "Displacements of the Uterus" are discussed in a well illustrated article by Dr. E. C. Dudley, of Chicago; "Disorders of the Uterine Functions," by Dr. J. C. Reeve, of Dayton, Ohio; "Inflammation of the Pelvic Cellular Tissue," and "Pelvic Peritoneum," by Dr. B. F. Baer, of Philadelphia; "Pelvic Hæmatocele," by Dr. T. Gaillard Thomas, of New York; "Fibrous Tumors of the Uterus," "Sarcoma of the Uterus," and "Cancer of the Uterus," by Dr. William H. Byford, of Chicago; "Diseases of the Ovaries and Oviducts," by Dr. William Goodell, of Philadelphia. In the last named article we naturally turn to see what this well-known conservative surgeon says upon the subject of Battey's operation. While admitting that it has been greatly abused, he advocates it warmly in suitable cases

and has evidently obtained very striking results in truly desperate cases, as, for example, in curing by this procedure four of five cases of ovarian insanity. "Diseases of the Urinary Organs in Women" are considered by Dr. J. C. Skene, of Brooklyn; "Diseases of the Vagina and Vulva," by Dr. Edward W. Jenks, of Chicago; "Disorders of Pregnancy and Diseases of the Parenchyma of the Uterus," by W. W. Jaggard, of Chicago; and "Abortion," by Dr. George J. Engelmann, of St. Louis. In most instances the names of the authors of these articles are so thoroughly identified with the subjects of which they treat that their fitness will be generally recognized, and the Editor may be considered fortunate in having secured such an able staff of collaborators in this department. The article on "Abortion," by Dr. Engelmann cannot be passed without a reference, as it is one of the most exhaustive in the language. The historical and ethical aspects of the question are fully discussed with the writer's well-known ability.

The "Diseases of the Muscular System" form a small but interesting section. Dr. J. C. Wilson, of Philadelphia, in the paper upon "Myalgia," has made a valuable contribution to the literature of a common affection not always accurately described in the text-books. The statement which he presents of the disease as a sub-inflammatory muscular condition, neither rheumatic nor neuralgic, is particularly clear and convincing. In the section on treatment, scarcely sufficient stress is laid on the great value of acupuncture in acute lumbago.

The allotment by the Editor of "Progressive Muscular Atrophy" to a place in the section of diseases of the muscular system, illustrates the doubt which existed as to the true nature of this disease—whether spinal or myopathic. Now it is very generally acknowledged to have a central origin, and this view is adopted by Dr. Tyson, of Philadelphia, the writer of the article. With "Pseudo-muscular Atrophy" the case is different; the evidence points strongly to a primary myopathy. Dr. Mary Putnam Jacobi, of New York, has prepared an elaborate memoir on the disease, complete in detail, and will prove invaluable as a reference to subsequent writers in this field.

An extensive section on "Diseases of the Skin," by Dr. Louis A. Duhring and Dr. Henry W. Stelwagon, of Philadelphia, will enhance the value of the work to the general practitioner, who seeks a convenient guide in the diagnosis and treatment of these affections. It really forms a condensed text-book and we only regret that the scope of the work did not permit of the insertion of illustrations.

Dr. W. F. Norris has contributed the article on "Medical Ophthalmology," which extends over fifty pages, and deals systematically with those affections of the eye most likely to occur in strictly medical practice. As an adjunct to diagnosis, the ophthalmoscope is not employed with the frequency which its importance demands, and we hope that this suggestive paper by Dr. Norris may stimulate many to take up a study which is essential in the practice of certain departments of medicine.

A well-prepared section on "Medical Otology," by Dr. George Strawbridge, of Philadelphia, concludes the volume.

The fifth and concluding volume is devoted exclusively to the diseases of the nervous system. The study of neurology has made rapid strides in this country within the last twenty years, and the number of men

who devote themselves to this interesting but difficult specialty is yearly increasing. Here, again, the Editor has been fortunate enough to secure the coöperation of well-known writers, and the volume, as it stands, forms the most exhaustive text-book on diseases of the nervous system which has been issued from the press of this country.

Dr. E. C. Seguin, whose name is so closely associated with the promotion of the study of neurology in New York, contributes the introductory article on "General Semeiology of Diseases of the Nervous System," and on the "Localization of Lesions in the Nervous System." In the former the general symptomatology is considered, and the various data analyzed under psychic, motor, sensory and trophic symptoms. The diagnosis of localization of lesions now plays such an important part that we could have wished a more extended account under this head, particularly of affections of the motor zone. The recent brilliant results of Horsely illustrate the practical outcome of many years of laborious study and experimentation, and will give a great stimulus to cerebral surgery. The admirable diagrams in this section will materially assist in the accurate definition of suspected lesions.

The section on mental diseases, prepared by Dr. Charles F. Folsom, of Boston, forms perhaps the clearest and most practical account of the various forms of insanity which has appeared in America. A little amplified, and it would be a model text-book; but as it stands the practitioner will find in it a trustworthy guide, and the student of psychology a careful presentation of the subject.

Dr. Charles K. Mills, of Philadelphia, is the most extensive contributor to this volume, and has written articles on "Hysteria," and its allied affections, "Hystero-epilepsy," "Catalepsy," and "Ecstasy;" and, with Dr. Lloyd, the papers on "Tumors of the Brain and its Envelopes," and "Tumors of the Spinal Cord." The first named articles are of unusual merit, and will take a prominent place in the literature of these subjects, as there is nothing in English so full in detail and which gives so clear a picture of the manifold variations of hysteria. In many respects this work of Dr. Mills forms the most interesting part of the volume, and we welcome it the more heartily as representing for the first time, in a systematic manner and with the necessary fulness, the features of these affections as seen in America.

The question of the localization of cerebral tumors is one of special importance, and is ably discussed by the authors, who have analyzed 100 cases, selected on account, first, of the carefulness with which they have been reported, and, second, with a view of determining by clinico-pathological data the possibility of diagnosticating the locality affected. The series of cases is appended and will be of value for reference. The subject of tumors of the cord and its membranes is considered in the same careful manner, upon the basis of 50 cases selected from the literature.

. Dr. Mills also contributes a short article on "Progressive Unilateral Facial Atrophy."

Dr. H. C. Wood, of Philadelphia, writes the articles on "Neurasthenia," "Acute Affections produced by Exposure to Heat," and on the "Syphilitic Affections of the Nerve-centres." The subject of neurasthenia is considered in a brief, though practical manner, and is very suggestive as to diagnosis and treatment. Dr. Wood need scarcely apologize for devoting an article to this subject, which is really one of great importance to the practitioner. It is true, indeed, as he says, that the term

now very often replaces that of general debility in the records of diagnosis, and in too many instances it is an indication of neurasthenia in the diagnostic powers or the zeal of the physician. Under the caption of "Acute Affections produced by Exposure to Heat," Dr. Wood considers heat exhaustion and sunstroke, which he regards as separate affections. To his labors the profession is indebted for a rational pathology of thermic fever, and for many details of treatment, and the article combines the scientific and practical in the happy style of this writer. No one in the United States has done more to advance our knowledge of cerebral syphilis than Dr. Wood, and in his article on "Syphilis of the Nerve-centres" shows, on every page, his wide experience in this department.

Dr. Wharton Sinkler, of Philadelphia, contributes an interesting set of papers on "Headache, Tremor, Paralysis Agitans, Chorea, and Athetosis." The article on "Chorea" is based on 282 cases at the Infirmary for Nervous Diseases, and presents a careful study of the clinical features of this common disease.

The article on "Vertigo," by Dr. S. Weir Mitchell, is an admirable clinical presentation of an obscure, and often obstinate affection.

Dr. Allen McLane Hamilton, of New York, considers the subject of "Local Convulsive Disorders and Epilepsy." In the latter article the practitioner will find much of interest, and the author speaks with the authority of one who has made a prolonged study of the disease.

"The Neural Disorders of Writers and Artisans" are very fully discussed by Dr. Morris J. Lewis, of Philadelphia, in a paper which must be regarded as one of the most valuable in the volume. We have but one fault to find in it, and that is in the name which he suggests, Copodyscinesia. Certainly it describes the chief characteristics of an affection with very varied symptoms, and perhaps we are unreasonable in our objection, but we have reached the period in professional life when a new name flurries; still, let us be thankful, as this is the only new one which the "System" contains.

The subject of "Tetanus" is dealt with by Dr. P. S. Connor, of Cincinnati, in a very comprehensive manner.

The article on "Disorders of Speech," by Dr. Edward P. Davis, of Chicago, is clear and concise, rather brief, perhaps, for so important a subject,

Dr. James C. Wilson, of Philadelphia, contributes an article on "Alcoholism," in which every aspect of this question is considered in detail. The arrangement which the author follows seems to us to be specially good. The tabular classification of cases of alcoholism would make a splendid campaign document for a Prohibition candidate.

The section on the "Opium Habit and Kindred Affections," by the same writer, will be found a most serviceable contribution, particularly in the question of treatment of this obstinate habit. Dr. Wilson also writes the article on "Chronic Lead Poisoning."

The various "Meningeal Affections" are ably discussed by Dr. Francis Minot, of Boston, who also writes the article on "Chronic Hydrocephalus."

Dr. John Ashhurst, Jr., contributes a short paper on "Spina Bifida."

Dr. E. C. Spitzka, of New York, contributes several very important sections. The article on "Anæmia and Hyperæmia of the Brain and Spinal Cord" is, we think, extended out of all proportion to the importance of

the subject, though the author treats of these conditions in a very pleasing and instructive manner.   The papers on " Acute and Chronic Affections of the Cord " are much more satisfactory ; that on " Tabes Dorsalis " is a model of careful clinical study.

In considering the question of " Concussion of the Brain and Spinal Cord," Dr. William Hunt, of Philadelphia, briefly, but clearly, states the chief features of these conditions, which are rather surgical than medical. His remarks on " railway spine " will be read with interest, as embodying the experience of a surgeon who has had, for many years, unusual facilities for studying the injuries of the back.

Dr. R. T. Edes, of Boston (now of Washington), contributes an extended article on " Intracranial Hemorrhage," which contains a very careful clinical account of the various forms of apoplexy.   The question of diagnosis is very fully considered.

One of the ablest and most critical articles in the volume is that by Dr. Mary Putnam Jacobi, of New York, on " Infantile Spinal Paralysis." The practitioner will find an unusually good and complete account of the treatment of this serious affection.

Dr. Schmidt, of New Orleans, contributes three short articles on "Atrophy and Hypertrophy of the Brain," " Disease of One Lateral Half of the Spinal Cord," and on " Progressive Labio-glosso-laryngeal Paralysis."

No subject in neurology has attracted more attention of late than " Diseases of the Peripheral Nerves," which is considered by Dr. Francis T. Miles, of Baltimore.   Even since the preparation of his paper there have been very important communications and it seems clear that peripheral neuritis plays a much more important part in affections of the nervous system than we had heretofore supposed.

The various forms of " Neuralgia " are discussed by Dr. James J. Putman, of Boston, in a most practical article in which the physician will frequently find many valuable suggestions for diagnosis and treatment.

The volume concludes with an admirable account of the " Vasomotor and Trophic Neuroses," by Dr. M. Allen Starr, of New York.

Altogether, Volume V. not only maintains the high standard of the previous volumes, but we should be inclined to say that it represents the best work of the entire " System."   There are in it certainly a larger proportion of articles worthy of comparison with any that have been written in other languages.

The work, as a whole, is one of which the profession of the United States may feel justly proud.   It marks a distinct era in the professional life of the country.   In any work of this kind by various writers it was inevitable that there should be some feeble productions, but the average quality of the work is excellent, and the flaws which exist can be readily remedied when a second edition is issued.   The rapidity with which the work has been issued is also a matter for congratulation, for the five volumes have appeared within two years and the entire time occupied since the conception of the scheme has been scarcely five years.   It seems, too, most appropriate that the profession should offer to the publishers their congratulations on the completion of such an undertaking in the very year which celebrates the centennial of a house which has done more than any other in this country to supply standard medical literature.

The labors of an editor in supervising an undertaking of this kind are not seen in the pages, and the clerical work forms the lightest part of his duties. The chief difficulties have been encountered in the assignment of subjects to suitable men and in getting the work done in reasonable time, and without the skill, tact, and organizing capabilities of the Editor the profession would have probably waited many years for a System of Medicine by American authors.

THE PEDIGREE OF DISEASE, BEING SIX LECTURES ON TEMPERAMENT, IDIO-SYNCRASY, AND DIATHESIS. Delivered in the Theatre of the Royal College of Surgeons, in the session of 1881. By JONATHAN HUTCHINSON, F.R.S., late Professor of Surgery and Pathology in the College; Emeritus Professor of Surgery in the London Hospital; President of the Ophthalmological Society, etc. 8vo. pp. 107. New York: William Wood & Company, 1885.

ANY work emanating from the pen of a writer so widely and favorably known as Mr. Hutchinson, is deserving of most careful study, and we shall endeavor to present such an abstract of his views as will fairly represent his position.

Mr. Hutchinson, we think, justly cautions against our utter repudiation of our forefathers' custom of prescribing " for a man's temperament," because the individual differences between man and man do exert important modifying influences upon disease. He then defines *temperament* " as the sum of the physical peculiarities of an individual, exclusive of all definite tendencies to disease." In other words, while temperament may impress some degree of peculiarity upon a disease, it does not involve any special proclivity to it. " When most strongly marked, temperament is still consistent with the prolonged enjoyment of perfect health." The author goes on to show that any distinct proclivity to a disease or series of diseases is a *diathesis*, which term he defines as " any bodily condition, however induced, in virtue of which the individual is, through a long period, or usually through the whole life, prone to suffer from some peculiar type of disease." Diathesis may be inherited or acquired ; the effects may be permanent, transitory, or recurrent after intervals of health. Dyscrasia must not be confounded with diathesis, the former term signifying definitely bad health, while the latter indicates proclivity merely, and is applicable to an individual in robust health. Mr. Hutchinson makes the broad statement, that an inherited diathesis commonly latent at birth, may become aggravated, or in rarer instances be susceptible of cure in after-life, while the constitutional peculiarities which are termed temperament are not susceptible of any such alterations.

Mr. Hutchinson's definition of idiosyncrasy is, " any definite peculiarity of organization of which the consequences may occur unexpectedly and otherwise inexplicably." He also thinks that " it is quite possible that the idiosyncrasies may in many instances have sprung from the diatheses, yet they have become in long hereditary transmissions, questions rather of organization than of disease." After some preliminary

remarks on the difficulty of the study, the writer points out that in the study of temperament the observer must scrupulously reject everything which is the result of the influences to which the individual has been exposed. "That which has accrued to him during life goes to produce, or aggravate diathesis, but can do nothing in modification of temperament." After proving the inapplicability of the generally accepted data for the determination of temperament, because subject to alteration by time of life, state of health, etc., he sums up with this: "as to complexion itself, the further he"—the observer—"goes the more he will have to confess that, putting various conditions of sanguification aside as being in many persons dependent upon varying states of health, he can after all classify the complexions themselves only in reference to pigmentation." Mr. Hutchinson then goes on to state his belief, "that varying states of pigmentation of the integument denote rather exposure to climatic influences than peculiarities of development."

The emphasis laid upon the subject of complexion by the author, is because "almost all observers unconsciously trust" to this "in their endeavors to discriminate the temperaments in persons in good health." A classification by race, such as Celtic, Scandinavian, Roman, or English, is suggested as more valuable than their division by "certain more or less hypothetical vital tendencies." Speaking of the latest and best attempts at the classification of temperaments,—Dr. Laycock's—he points out that in reality his knowledge was more dependent on the recognition of diathesis than on the discrimination of temperaments.

After much correct argument proving the fallacies of so-called temperaments, the author says:

"The peculiarities which denote family and race must be viewed with the utmost caution" . . . . "by the physician in respect to tendencies to disease. They are usually of no use, and they may easily mislead. It is only indirectly that they may become valuable—that is, when the special proclivities of the race or family in question are known beforehand. A thick upper lip, when it occurs in a mulatto, denotes descent only, and not scrofula." While believing that "there are differences—mental, moral, and physical—between the fair and the dark, yet it would be extremely difficult to say anything definite as to what these differences are." . . . . "Thus then, I think, we may believe that in the English climate the abundance or comparative absence of pigment in the tissues does not, *per se*, make any appreciable difference in the vital endowment of the individual."

Noting briefly the most striking points remaining in this lecture, we find Mr. Hutchinson teaches that

"all marked deviations from the normal type should be held in some degree of suspicion. Thus, if the hair is markedly coarse, or unusually fine, if the skin be very thick or very transparent, we are perhaps justified in suspecting that there may be in other tissues similar departures from the average constitution, some of which may prove inconsistent with the preservation of perfect health."

These remarks are à *propos* of the other conditions usually included with differences in pigmentation in what is understood by complexion.

Lecture II. is occupied with the consideration of the most remarkable facts known with respect to idiosyncrasy. It is insisted that this term merely denotes our ignorance of causes without implying disbelief in their existence, and the belief is expressed that time will remove this ignorance, so that the results assigned to idiosyncrasy will be transferred

one by one to the domain of the several diatheses, concerning the causes of which something, at any rate, if not all, is known. Idiosyncrasies "are diatheses, or parts of diatheses, developed, intensified, and specialized by hereditary transmission." They are certainly due to structural peculiarities the author contends, and are congenital, although some indeed may be overcome, or modified as age advances. Howsoever peculiar some of them may be, there is usually to be noticed a certain reference to law and order.

The third lecture is entirely devoted to idiosyncrasy.

Mr. Hutchinson places himself squarely against the germ-theory of diphtheria and erysipelas when he says:

"Many persons will take them by contagion in whom other causes would have proved abortive. But both are capable of spontaneous origin, or, to speak more correctly, may be produced by exposure to certain non-specific influences, such as the ordinary causes of catarrh, injuries, sewer-gas, and some others. It is most important that all who value accurate classification should deny, both as regards erysipelas and diphtheria, their right to rank with those fevers which are due to specific animal poisons. With these, as it seems to me, neither of them has any real affinities. In both, I repeat, that with which we have to deal is a personal and inherited peculiarity, giving proclivity when certain exciting causes are brought to bear, to peculiar forms of inflammatory action. In both the disease is probably local at its origin; in both it spreads locally by the contagion of continuity of tissue, and in both constitutional symptoms result which are in some ratio with the extent and severity of the local action."

In Lecture IV. the author aims "to discover whether there exists any large group of states of personal peculiarity giving special proclivity to diseases which can be suitably defined and named." To facilitate this study of diathesis a rough classification of the causes of diathesis is suggested, the first being in relation to *climate*. The first considered is the "malarial diathesis," which "is probably in some degree hereditary, the inheritance being, we may suppose, in ratio with the severity and length of duration of the disease in the parent," Another, belonging to this group, is that which results in bronchocele and cretinism. Diet-diatheses are sometimes hereditary, sometimes acquired—*i. e.*, gout. Mr. Hutchinson, as is well known, considers that leprosy is due to a fish diet, but frankly admits that this theory is not as yet commonly admitted. Among the results of the gouty diathesis the author includes

"a large number of cases of crippling rheumatism, almost all those which are known as spondylitis deformans, a great majority of the cases of gonorrhœal rheumatism; most of the severe forms of neuralgia occurring to young persons, and many peculiar liabilities to hemorrhage."

Mr. Hutchinson, in Lecture V., considers malignant new growths with reference to diathesis.

We can here assure our readers that these lectures of Mr. Hutchinson will well repay the most careful study. They contain a mass of information, and of facts drawn from an unusual personal experience in many special fields of surgical practice, such as falls to the lot of few men. It is only exceptionally that a man becomes an authority in so many branches of our profession, and for that very reason the conclusions he draws from such varied experience should receive the most careful and respectful attention, however much they may run counter to our own impressions, which must, of necessity, have been founded upon far fewer data.   C. B. N.

The Anatomy of the Intestinal Canal and Peritoneum in Man. The Hunterian Lectures for 1885. By Frederick Treves, F.R.C.S. 4to. antique, vellum, pp. 66, pl. iv.   London: H. K. Lewis, 1885.

We owe Mr. Treves an apology for so late a notice of his book. But, as though to atone for our tardiness, our welcome of the excellent work shall be even more than hearty.   Our copy is really an *edition de luxe*, worthy of the author and publisher, and especially of the place and subject.   John Hunter himself would feel honored by a brochure of such elegance and worth.   We have noted a number of valuable facts observed, to some of which we will call attention.

Physicians certainly do not appreciate the process of growth of the intestine in infants.   Hidden in the belly cavity, its silent but incessant activity is not appreciated.   At birth the small intestine measures nine feet five inches in length.   In the first thirty days of extrauterine life the growth is actually two feet or nearly one inch *per diem*, and the second month witnesses a similar growth.   After that time the rate varies much.   What a lesson this should teach doctors and mothers as to the simplicity, and regularity, and quality of the diet.   With two such factors as this rapid growth and extraordinary functional activity in digestion, the dangers arising from indiscreet food are magnified fourfold.   Indeed, the rapidity of growth of the entire body in the first year is far more than at any other period in life ; almost eight inches are added to the length of the entire body and the intestine nearly doubles its length.

Mr. Treves next calls attention to the " *plica* and *fossa duodeno-jejunalis*," a fossa formed by a fold of serous membrane passing from the parietal peritoneum to the duodenum and the seat of retroperitoneal hernia, of which already nearly fifty examples are recorded.   The careful description and multiple drawings of this fossa and fold are an excellent contribution to anatomy.

The position and relations of the small intestine and right half of the colon are very different in the fœtus and the adult.   At first they have a common mesentery and consist of a simple loop supplied by the superior mesenteric artery.   By a semi-rotation the colon crosses over the duodenum to reach the right hypochondrium, but the caput coli is as yet just under the then large liver and practically no vertical ascending colon and hepatic flexure exist.   Gradually, as the liver shrinks, the cæcum sinks into its normal position, the oblique colon assumes its vertical and transverse positions as ascending and transverse colon, and the adult phase is established.   This history explains not a few important practical points.   Thus the cæcum is usually entirely covered by peritoneum and has no meso-cæcum ; it lies on the psoas muscles and not the iliacus, and not seldom projects over or even falls into the pelvis ; in eighteen per cent. of the cases it lay entirely within that cavity.   With such a freely movable cæcum it is not suprising that it sometimes occupies the hernial sac —indeed, it is surprising that it does not protrude more frequently.   So movable is it that in eleven per cent. the cæcum could be made to touch the liver and the left side of the pelvis, and in several cases it could be drawn down to the level of the great trochanter.

As Mr. Treves points out, it is an anatomical impossibility in inflamma-

tory conditions of the cæcum to open the belly through the loin and reach the cæcum without opening the peritoneal cavity. Moreover, in a few cases the cæcum never does descend into its proper place, and in these cases there is no ascending colon—a fact not to be forgotten by the surgeon when considering the question of right lumbar colotomy, as already pointed out by Mr. Lockwood.

Mr. Treves's methods of study were excellent and painstaking. His book is based on the examination of one hundred bodies of those dying without known abdominal complications and each part was drawn *in situ* and later studied in detail. One method that bore but little fruit, but which shows the minute care he bestowed on his work—a model and a stimulus to many of our younger anatomists—was, on opening the belly, to attach a numbered brass tag to each coil of intestine, and later to study the position in the belly and distance from the pylorus of each tag, so as to establish (if any existed) the constant position in the belly of any particular part of the bowel. No such localization could be made out—a negative fact itself of value as precluding hereafter fanciful diagnosis based on such an assumption. Another practical point is the study of what coils of intestine occupy the pelvis. In the fœtus there are none, but they appear there soon after birth. Usually the impression is that only coils of the ileum occupy the pelvis, but Mr. Treves shows that that part of the intestine which has the longest mesentery—the part between two points, six and eleven feet from the duodenum—is not uncommonly found there. In two cases very nearly *all* the small intestine was found in the pelvis. And it is not uncommon to find the apex of a V- or U- shaped transverse colon in the pelvis. The bearing of these points in many cases of pelvic surgery and medicine is evident.

The sigmoid flexure seems to be a myth that Mr. Treves would sweep away, though we confess that his Fig. 21 A seems to justify the name at least. His iconoclasm is such that he says "the flexure does not occupy the iliac fossa, its mesocolon does not arise wholly from that fossa, its course is not that of either the letter S or the letter Σ, and the first part of the rectum is not disposed in the manner familiarly described." Most of our readers, we venture to think, in introducing a long tube by the rectum, after reaching the upper end of the rectum would direct the tip toward the left iliac fossa and endeavor to worm through an S-shaped gut in order to reach the descending colon. Mr. Treves describes and figures the bowel thus: Starting from the end of the descending colon the bowel crosses the psoas muscles, dips into the pelvis, then forms a loop to the right reaching as far as the right border of the pelvis and then descends to the third piece of the sacrum, where it loses its peritoneal covering, and properly becomes the rectum. The flexure in the fœtus and child is rather omega-shaped than like any other letter, and the flexure and the first part of the rectum, as usually described, form one curve of an average length in the adult of seventeen and one-half inches. He proposes, therefore, to limit the term rectum to that part of the bowel from the third piece of the sacrum to the anus; and, we think justly.

We have not alluded to several other points we had noted in a careful reading of this very interesting and practical book. It shows again—and the lesson cannot be too often repeated—that even in these later anatomical days a careful study of even the gross anatomy of any

part of the body will well repay the time and labor bestowed, eliciting unknown facts, correcting unsuspected errors, and adding materially to the fame of the student himself. We regret not a little that, when studying so carefully the anatomy of the bowel, he did not investigate the *capacity* of the colon, with a view to determining the proper amount of fluid that could be injected. In "high injections" we often have injected nearly a gallon before any material pain was produced ; but whether the whole colon was then filled or not, we are in great doubt.

<div style="text-align: right">W. W. K.</div>

THE REFRACTION AND ACCOMMODATION OF THE EYE, AND THEIR ANOMA-LIES. By E. LANDOLT, M.D., Paris. Translated under the Author's super-vision, by C. M. CULVER, M.A., M.D., Albany, N. Y. Octavo pp. xi. 600, with 147 illustrations. Edinburgh : Young J. Pentland, 1886.

IT would be difficult to consider this book without, to some extent, comparing it with the treatise of Donders. Though they are separated by a period of over twenty years, no work attempting the same combina-tion of physics, physiology, and clinical experience, has appeared in the interval. Both deal with the same subjects, approaching them from similar points of view, both works were well written and have been very well translated ; on most points they are equally clear for the student, equally safe for the practitioner. But, while the former was a recasting of the knowledge of the time, and a revelation of new fields for investi-gation and practice, the later work is little more than restatement of prin-ciples and facts well and generally understood, and confirmed by many observers. Indeed, what strikes one most forcibly on reading Landolt's good presentation of the present state of knowledge and practice in this direction, is the idea that it has taken the better informed and more enterprising part of the profession all this time to come to a full appre-ciation of what Donders taught ; and there is a lingering suspicion that the appreciation is not yet complete.

The volume is divided into three parts, a " physical," a " theoretical," and a " clinical " portion. The first of these, the author says, " is speci-ally devoted to those who take a particular interest in the scientific solu-tion of the questions under consideration;" and " it is hoped, that the first chapter will enable the reader to dispense with other books on physics, as far as concerns the resolution of the most essential problems in ocular optics."

It does not take up all possible problems that might be considered in this connection ; but, giving abundant references for the more abstruse and less practical, it sets forth in one hundred pages of clear, brief, rigorous, mathematical statement, the demonstrations of primary impor-tance. For the thoroughly prepared student, this portion constitutes an admirably well-written text-book. But its easy understanding requires, at least, a very thorough training in elementary mathematics. The author says : " its perusal, however, may be entirely omitted; the reader may begin with the second chapter, in and after which he will find no formulæ, and yet will easily understand the meaning of the text." This seems com-

forting to the man who has forgotten his algebra, or who never penetrated geometry much beyond the *pons asinorum*. But, when he begins with the second chapter, he will be speedily undeceived. Such expressions as " $f'' = \dfrac{f' \ F''}{f' - F''}$ " with numerous references to the first chapter, the development of tables for axial and curvature ametropia, the consideration of the amplitudes of accommodation and convergence, are calculated to suggest to him the idea that he who attempts ophthalmology without mastering its physical and mathematical basis, consents beforehand to the inferiority of superficial knowledge, and imitative and routine practice. This is an idea that many who intend to " make a specialty of eye diseases " would do well to ponder. In so far then as this arrangement of the book is an attempt to evade the laws of mental development, that the ignorant may have the advantages of knowledge, and the untrained be able to grapple with difficult mathematical conceptions, it is a failure. In a sense it may be true that the later chapters " form an elementary manual on refraction and accommodation, stripped of analyses and formulæ." But he who needs to have his manual so stripped, will find works better suited to his understanding already in the market.

Chapter II., opening the theoretical portion, is headed " The Refraction of the Eye," but it also contains a consideration of the accommodation ("dynamic refraction"), and convergence, and of the relations of accommodation and convergence. We note here a clear explanation of what the author designates as the angle *alpha;* but regret that he applies the name to " *the angle formed by the line of vision with the major axis of the corneal ellipse*," instead of giving it to " *the angle formed by the optical axis and the visual axis* " (line of vision ?), as he did in his *Manual of Examination of the Eyes*, and as almost all other writers on the subject have done. Undoubtedly there has been some confusion as to the angle alpha, and especially as to methods of measuring it. But it does not help matters to propose an entirely new angle to be so designated, even though it does not, in practice, materially differ from the one already known by that name. This chapter also gives an excellent explanation of the metre-angle which will be further referred to presently.

Chapter III., which deals with the " Methods of Determination of the Refraction and Accommodation of the Eye," gives a good description of the common method with test-lenses and test-types. There is also an excellent exposition of the principles upon which the various forms of optometers and other methods of determining refraction are based.

The description of retinoscopy seems to be drawn from reading rather than experience ; and there is an allusion to " those who avail themselves of this kind of optometry," which indicates that the author is not one of them. Still he is able to propose another new name for this much-named procedure—" *koroscopy ;* " which is simply " pupilloscopy " with a Greek, instead of a Latin root, to combine with the Greek terminal. Worse yet, he continues to use the old name, as well as the new, throughout the description of it.

The general plan of the book is violated to bring all reference to astigmatism into Chapter IV.; where, in less than forty pages, it is considered with a brevity entirely disproportioned to the general scale of the work. The chapter might do for a small student's manual, except

that the practical portion of it is so meagre and so unsound. Against more than a hundred pages devoted to developing the theory of spherical refraction, there is not a line of description of a cylindrical lens. The Stokes lens is not alluded to. The principal meridians in regular astigmatism, we are told, " are generally (sic) perpendicular to each other." By " koroscopy," " one may succeed even (sic) in ascertaining the *direction of the principal meridians.*" After getting some insight into the author's imperfect appreciation of the subject, it scarcely surprises us to read : " We very seldom have recourse to atropization for the determination of astigmatism."

The " clinical " portion, so-called, embracing some two hundred and fifty pages, shows the writer to be more theorist than clinician. This is less of a disqualification here than it would be in any other department of medicine ; but, even here, it causes serious omissions. For instance, we find no hint of the possibility of a connection between eye strain, and chronic, or recurrent acute, conjunctivitis, and blepharitis.

But justice has been done to the defects of the work ; let us turn again to its good points. Among these are its treatment of the effect of spectacle lenses upon convergence, and on the fitting of spectacle frames to the face of the patient. As to the latter, we quote : " This question is generally too much neglected by the practitioner, as if the slightest detail in the execution of his orders were not of the highest importance for the patient." Of spectacle glasses : " One should test them when made, not alone from an optical point of view, but also from the point of view of their adaptation to the patient's face and to the conditions under which they are to be used." " If ophthalmology has made progress, industrial optics have done the same, and still more may be accomplished in this latter line, under the guidance of educated practitioners."

But it is Landolt's account of the *disorders of convergence* that the practical ophthalmic surgeon will find of most interest. His views on this subject are definite, clearly stated, and well illustrated by diagrams and clinical records. Moreover, they are, to some extent, new ; and quite worthy of general attention.

If a pair of normal eyes look at some point directly in front of them, their visual axes will converge to meet at that point. Now calling the line joining the centres of rotation of the two eyes the *base line*, and drawing, from the point fixed, a perpendicular to the middle of the base line, the angle included between each visual axis and this perpendicular is the *angle of convergence.*

" The size of the angle of convergence depends, on the one hand, upon the length of the base line ; on the other hand, upon the distance of the object. The base line having a constant value for each individual, we may regard the angle of convergence as depending solely upon the distance of the object. In proportion as this distance diminishes, the angle increases ; the nearer the object approaches, the more convergence is required in order that it may be seen binocularly. Hence, we may say that *the angle of convergence is inversely proportional to the distance between the object fixed and each of the eyes.*" " The unit is the angle of convergence necessary in order to fix simultaneously, with both eyes, an object situated on the median line, at a distance of one metre from each eye. We are indebted to Nagel for the ingenious idea of rendering the mensuration of convergence so simple, and, as we shall see, so practical. He calls this unit-angle the 'Meterwinkle,' *metre-angle.* We shall designate it as *ma.* Convergence is, in this way, easily expressed. If we have to do with an object one-fifth of a metre distant, we know that the converg-

ence requisite for binocular vision at this distance, is $\frac{1}{\frac{1}{5}} = 5\ ma$; for five metres we shall have $c = \frac{1}{5}\ ma$, and so forth."

It will be seen that the exact value of the unit, or metre angle, in degrees, varies in different persons directly with the base line or distance between the eyes; also, that its value increases slightly for the higher degrees of convergence. Tables showing its value for different base lines, and different degrees of convergence are given. But these variations are so slight that they may be disregarded in practice, and the metre angle assumed to have a constant value of one and three-quarter degrees, about the deviation produced by a prism with a refracting angle of three and one-half degrees.

"The *maximum of convergence* is the inverse of the distance between the *nearest point* (*punctum proximum of convergence*) which can be fixed binocularly, and each of the eyes." "The *minimum of convergence* is the inverse of the distance between the farthest point which can be fixed binocularly (*punctum remotum of convergence*), and each of the eyes." "The difference between these two values is the amplitude of convergence."

To determine the maximum of convergence, Landolt uses what he calls an *ophthalmo-dynamometer*. This presents a vertical line of light, which is pushed up toward the patient's eyes until, in spite of the greatest possible effort at convergence, it just begins to appear double; when its distance from either eye is read off from a tape-measure attached to it. To determine the minimum of convergence, it is commonly necessary to use prisms, for most people can not only render their visual axes parallel, but they can also cause them to diverge. The extent of this power of divergence is estimated by fixing the eyes on a distant object and ascertaining what strength of prism, with its base turned toward the median line, can be overcome and the object still seen single. When the visual axes diverge forward, they, of course, converge backward. Hence such divergence is spoken of as *negative convergence*. In a case where each visual axis diverged one and three-quarter degrees, from the perpendicular to the base line, the condition would be indicated by $c =$ $-1\ ma$. If such a person had a maximum convergence of $9.5\ ma$, which Landolt states to be the average, the amplitude of convergence would be

$$9.5\ ma - (-1\ ma) = 10.5\ ma.$$

Having thus determined the amplitude of convergence, our author has undertaken to ascertain what proportion of this power is available for continuous use. He says:

"The experiments which I have made, with a view to furnishing the answer to this question, are of recent date and not yet as numerous as I could wish. They tend to show that the quota of convergence, which can be utilized for continuous work, ought not to amount to more than one-third, or even one-fourth of the positive convergence power; hence that two-thirds or three-fourths of the latter should be kept in reserve."

When the one-third or one-fourth of the maximum, available for constant work, is insufficient for the needs of the patient, recourse must be had to expedients for increasing it. In addition to those hygienic and medicinal agencies which tend to increase the power of the muscu-

lar and nervous systems in general; and the special exercise of the particular muscles in question by orthoptic training, prisms may be resorted to.

"But the use of prismatic spectacle glasses is limited. Besides the property of deflecting luminous rays, they possess others which are injurious to vision as soon as the prism reaches a certain strength; for instance, chromatic aberration, an apparent alteration of surface form, and seeming recession of the object looked at. Moreover, prisms, whose strength exceeds a few degrees, are so heavy that their use as spectacle glasses soon becomes burdensome. At all events, it is scarcely practicable to wear prisms of more than five degrees."

"Hence we must have recourse to *surgical methods*. Instead of compounding with the affection and laboring further with the inadequate muscular power, in the way of artificial deflection of rays, we shall augment the convergence power, and extend its province by operative means.

The activity of the adductors may be increased, in the first place, by lessening the strength of their antagonists, the abductors. This end is attained by tenotomy of one or both of the *recti externi*. On the other hand, the convergence may be strengthened by giving the muscles which preside over this function a more favorable point of action. This is accomplished by *advancement* of one or both of the *recti interni*. These then become inserted farther forward on the eyeball, nearer the cornea, and, moreover, in the process of cicatrization they undergo a certain amount of shortening. In this way their action on the rotation of the eyeball—*i. e.*, on convergence—is certainly strengthened, and the more so in proportion as the muscle has been brought further forward. Finally, we may combine both of these operations—advancement of the adductors, and tenotomy, or setting back of the abductors. In this way any desired degree of convergence can be obtained, provided that there does not exist a pathological weakness of the muscles or of their innervation. On the other hand, it may at times become a question as to whether or not the range of convergence will allow of the diminution, at the extremity of its *punctum remotum*, which will be produced by the operation. For it will readily be perceived that, by bringing the *punctum proximum* nearer, the risk is sometimes incurred of bringing the *punctum remotum* too near, through weakening of the abductors."

"However unpleasant it may be to commit a therapeutic error in the prescription of glasses, it is but seldom followed by serious consequences, especially when it is recognized in time and corrected. But it becomes quite another matter when it is a question of surgically affecting the muscular system of the eye, and, indeed, especially in the case under consideration, where there is a simple insufficiency of the muscles. The less considerable the motor disturbance, the more difficult and the more delicate is its surgical treatment."

In regard to the differentiation of the cases proper for surgical interference, the author says:

"Taking all in all, it is possible to distinguish two forms of motor asthenopia, which are distinctly separated from each other. The first we may designate *muscular asthenopia in the true sense of the word*. It depends upon the absolute or relative weakness of the adductors or upon their insertion. The second has its origin in the *central organ*, and depends upon a disturbance of innervation or upon a weakness of the power of fusion. The excursions of the eyes, the monocular fields of fixation, and the associated movements may with all this be quite normal, whilst the amplitude of convergence is much reduced, or even, at times, equal to zero."

In the first class brilliant results may be attained by operative interference; in the second it may cause temporary improvement, but in the end almost always proves unsatisfactory. Specific rules are not given for determining, in a given case, to which class it belongs or which

operative procedure is to be resorted to. But tenotomy of the externi seems indicated where, with deficient positive, there is an excess of negative, convergence; while cases in which there is marked lessening of the amplitude of convergence are better adapted to the advancement of one or both interni. Operation does not merely add to the positive convergence what it takes from the negative, bringing the whole range just so much nearer to the eye; but in good cases the gain is greater than the loss, so that the amplitude of convergence is actually increased. In one case cited, this increase was from 8 _ma_ to 15.5 _ma;_ in another, it was from 5.5 _ma_ to 22 _ma._ Sometimes, however, gain and loss just balance, or in badly chosen (neurasthenic) cases the loss may be greater than the gain, and the patient the worse for the operation.

The author's method of recording these cases is simple and graphic, and is worthy of attention. The spaces between the parallel lines running across a page are taken as each representing a metre angle. The zero line is near the top of the page, and the negative convergence laid off upward, the positive downward. Then the case is recorded by simply drawing a straight vertical line extending over the spaces which represent its metre angles of convergence. In this way many cases, or many observations of the same case, may be recorded on one page and compared at a single glance.

As Landolt says: " We must confess that our knowledge as regards muscular asthenopia and insufficiency of convergence is still in its infancy." And it is to be hoped that his account of them will stimulate others to the recognition and study of these cases.

As our quotations would indicate, Dr. Culver, the translator, has done his work thoroughly and well. The volume is comparatively free from mistakes. Its execution places it in a small list of very finely made books that have recently been issued in Edinburgh. The diagrams are of peculiar excellence throughout. Of the three colored plates of the fundus, two are good ; but the third if not labelled "normal" would leave one in doubt as to whether it was intended to represent a great hemorrhage in the region of the macula, or some hitherto undescribed anomaly.   E. J.

PRACTICAL HUMAN ANATOMY. A WORKING GUIDE FOR STUDENTS OF MEDICINE AND A READY REFERENCE FOR SURGEONS AND PHYSICIANS. By FANEUIL D. WEISSE, M.D. 8vo. pp. xii. 456, with 222 plates. New York: Wm. Wood & Co. London: Cassell & Co., 1886.

IT is not often that we have had so much pleasure in looking over a new anatomical book. In every way this has pleased us. The good paper, large and clear type, make it delightful to read, a delight to which the text, as a rule, adds by its brevity and clearness, while the plates are a monument to the skill of Mr. Cohn.

It is an admirable dissecting-room guide. The directions are very clear and practical, the plates indicate excellently, as a rule, where the muscles, fasciæ, etc., should be divided to get at deeper parts (no small help to a beginner), and, except for its bulk, we should expect it to become the favorite cisatlantic Dissector's Manual.

Of the plates—and the book is half plates—more than half in bulk —we cannot speak too highly; we have carefully looked over nearly every one to find any errors and were baffled in our search (except that in our copy by an error in binding Plate 58 is left out altogether) till we got to the very last one, and there it was only in a name—"processus e cerebello ad testis." They are simply marvels of accuracy and elegance.

The author's style, however, lacks something, here and there, in accuracy in the use of words, which shows itself even in the sub-title, for there is no such substantive as " a Ready Reference." Thus, his constant use of " section " as a verb, in the imperative or other moods— e. g., " section the superficial vessels," "a part is only to be sectioned at that stage," etc., cannot be justified. On page 9 he says : " The veins of the body are subcutaneous and comites." Not only is this a puzzling statement in its odd use of the Latin adjective, but it is erroneous as a classification, as, indeed, he immediately shows by saying " some of the deep veins are *not* comites. The venous channels (sinuses) within the cranium are not comites." How much better to have divided the veins into "superficial and deep," and then explained that "most of the deep veins are companion vessels ('venæ comites') to the arteries and run one on each side of them." Then, too, Lindley Murray would scarcely approve of the following sentence : " A body, dissected by eight, there will be two to the head and neck, etc."

We point out these minor faults that they may be corrected in later editions, for that later editions will be called for is certain. But in general, we may say that the text is nearly as free from errors as are the plates, and that the whole book is a credit to author, artist, and publishers.   W. W. K.

RECENT WORKS ON BACTERIOLOGY.

I. THE METHODS OF BACTERIOLOGICAL INVESTIGATION. By DR. FER-DINAND HUEPPE. Translated by HERMANN M. BIGGS, M.D. Illus-trated by thirty-one woodcuts. 8vo. pp. 218. New York : D. Appleton & Co. London : Cassell & Co., 1886.

II. DIE METHODEN DER BAKTERIEN-FORSCHUNG. Von DR. FERDINAND HUEPPE. Dritte, vermehrte und verbesserte Auflage mit 2 Tafeln in Farbendruck und 40 Holzschnitten. 8vo. S. viii. u. 244. Wiesbaden : C. W. Kriedel's Verlag, 1886.

III. DIE PATHOLOGISCH-HISTOLOGISCHEN UND BACTERIOLOGISCHEN UNTERSUCHUNGS-METHODEN, MIT EINER DARSTELLUNG DER WICH-TIGSTEN BACTERIEN. Von DR. KARL HUBER und DR. ARNO BREKER. Mit 13 Abbildungen im Text und 2 farbigen Tafeln. 8vo. S. viii. u. 122. Leipzig : J. C. W. Vogel, 1886.

IV. NEUE UNTERSUCHUNGEN ÜBER DIE CHOLERA-MIKROBEN. Von DR. E. VAN ERMENGEN. MIT AUTORISATION DES VERFASSERS FREI BEARBEITET. Von DR. RICHARD KUKULA. Mit 6 Tafeln. 8vo. S. iv. 105. Wien : W. Braumüller, 1886.

THE translation of Hueppe's admirable work upon *The Methods of Bacteriological Investigation* was undertaken by Dr. Biggs for the benefit,

of students in New York, and the completion of the work must have been of great advantage to those who were not able to have access to the original.

The book treats the subject in an exceedingly clear and comprehensive manner, and leaves little to be desired by the beginner, and is a complete guide to those wishing to work out any of the innumerable problems connected with the life-history of the bacteria. The author, before beginning his task at all, seems to have made an exhaustive study of all the work previously done in bacteriology, and has given in his manual only those methods which have borne the severe test of experience. The true saprophytic forms are first discussed, and the differences between pathogenic and non-pathogenic bacteria are made clear.

The various methods of preparing bacteria for the microscope and of obtaining pure cultures of these organisms are given at length, inoculation experiments for the determination of the causal relation of bacterial growth to decomposition and disease are treated of, the general biological problems involved are mentioned, and, of course, the special investigation of earth, air, and water. The book is brought to a close by a concise and complete statement of the necessity of making bacteriology an object of instruction—a necessity which very few medical men care to deny at the present time.

Written by a pupil of Koch's, this book naturally gives very great prominence to the views of this leader, and his methods are those which are treated of in particular. It would be difficult, however, for a more impartial statement of all sides of the controversy as to methods to be made, and, inasmuch as Koch's work is the best, and his methods the most accurate that have as yet been suggested, it cannot be said that they have received an undeserved prominence. The translation seems to be well done.

In the preface to the translation just spoken of, it is implied that the work was done with Dr. Hueppe's approval, and it is to be regretted that the translation was not delayed a little longer, for the reason that almost on the day when the translation reached us we received from Wiesbaden a copy of the third edition of the original. This third edition contains much new and valuable material, which should have been included in the American reprint, and doubtless will be so included upon the issue of a new American edition. The new material embodied in the original includes a very good description of Fol's methods for the protection of sterilized fluids from contamination—given in full in *La Nature*, No. 619, 1885—some of which are well worth attention and adoption, and a description with figures of Chamberland's unglazed porcelain filters. Thus far, these filters seem to be the only ones which are actually bacteria-proof for any length of time, thus permitting fluids to be freed from bacteria—sterilized without heating. There are many minor additions scattered through the book, and it may fairly be said that there is not in existence a more complete manual for the student in bacteriology than this third edition of Hueppe's work. The rapid advances in technique will make necessary something still more freshly revised in the near future.

The little book by Huber and Breker is of a different style and complementary to that of Hueppe. It is an abstract from Birch-Hirschfeld's *Pathological Anatomy*, and is likely to be of very great service to the bacteriologist. The authors have divided their labors and their book

into two distinct parts: the first, by Dr. Huber, being devoted to the microscopic technique; the second, by Dr. Breker, to a short description of culture methods, and a full classification of all the described varieties of bacteria. In both cases the work is well done, but that portion of it which seems to be of the greatest use to the investigator is the second half, which contains descriptions of nearly eighty varieties of bacteria, with references to the original monographs. These references might occasionally be more definite, but in all cases they are sufficient to enable one to discover the original work without any great difficulty. A very valuable addition to the work is a double-page lithograph, containing thirty-eight figures in colors, showing the appearances under cultivation, and in different media of a number of the most important bacteria. In most cases these figures represent the originals with a very considerable degree of accuracy, and the plate is certainly one which may be studied with advantage, and would even be worthy of framing for the walls of a bacteriological laboratory.

The very best, and in every way most complete, monograph upon the bacteria of cholera which has yet appeared is that of van Ermengen, published last year. We are very glad, indeed, to note that its merits have been sufficiently acknowledged to permit the appearance of this translation into German, and wish that it had also been brought out in English. The illustrations accompanying the original, and this translation also, are triumphs of the method by which they were made.   H. C. E.

Diseases of the Tongue.   By Henry T. Butlin, F.R.C.S., Assistant Surgeon and Demonstrator of Practical Surgery and Diseases of the Larynx in St. Bartholomew's Hospital, lately Erasmus Wilson Professor of Pathology at the Royal College of Surgeons. 12mo. pp. 451. Illustrated with chromo-lithographs and engravings. Philadelphia: Lea Brothers & Co. London: Cassell & Co., 1886.

This work is stated to be an encyclopedic treatise upon the diseases of the tongue, and a careful examination of its contents justifies the claim, for in it are described all the ailments of this unruly member, it matters not how trivial they may be.

After a brief introductory chapter, the accidents to the tongue are considered, such as burns and scalds, stings and bites, wounds and foreign bodies. A schematic classification of the different morbid appearances of the tongue when various corrosive liquids have come in contact with it is given, and will prove of value. Corrosive sublimate is stated to produce a very characteristic appearance, the tongue becoming white and shrivelled, and the papillæ at the base greatly enlarged, whilst sulphuric acid causes the organ to become white and glazed, and nitric acid renders it swollen and citron colored. Wounds of the tongue heal very readily, and are to be treated upon exactly the same principles as wounds of the soft parts elsewhere. One would think this advice to be superfluous, but that this is not the case is well illustrated in the case of a young lady who was recently under our professional care. She had

bitten her tongue severely in childhood, and in response to inquiries of the mother, the attending physician said it was not necessary to sew it, as it would not prevent her from getting a husband. She has to this day a deformity of the tongue which is very noticeable, and which a few sutures would have obviated.

Anomalies of the tongue are rare, and there is but one authentic case on record of its complete congenital absence, that of Jussieu, reported in 1718. Speech was but little affected by this malformation, but mastication and deglutition were difficult owing to the collection of food around the teeth and between the cheeks and teeth. Bifidity of the tongue also occurs occasionally as a congenital deformity.

Most practitioners will agree with the author in the statement that the frænum is divided frequently, when there is no necessity for doing so. Too great length of the frænum sometimes allows the tongue to slip backward and so interfere with respiration; this condition is known as tongue swallowing, and three cases were related by Petit as far back as 1742, in two of which death resulted from the impaction of the tongue in the pharynx. Other cases have been reported by different authors, and the affection whilst usually occurring in infants sometimes affects adults; thus Dr. R. H. Thomas, of Baltimore, reports in *The Medical News*, of August 19, 1884, the case of a young lady in whom there was an acute spasmodic attack of retraction of the tongue with suffocative symptoms. A case of extreme mobility of the tongue is also well known to us in the person of a physician, who can, at will, turn his tongue backward to such an extent as to put its tip into the pharynx behind the uvula.

Passing over the discolorations of the tongue, some of which, as the "black tongue," defy etiological explanation, we note the chapter upon "Inflammation of the Tongue." Acute glossitis is admitted to be an exceedingly rare disease, but one which has been accurately described, and which can scarcely fail to be recognized by the pain in the organ, difficulty in mastication, and rapid increase in size. Mild cases may be treated by astringents, ice, or leeches; but when the symptoms are severe incisions should be made deeply into the substance of the organ. Under this treatment the swelling rapidly subsides, suppuration is prevented, and convalescence is rapidly established. Hemiglossitis is an even rarer affection than inflammation of the whole organ, and usually subsides promptly under mild general and local treatment. It is remarkable that a part which is so exposed to irritation of various kinds, should be so exempt from inflammatory diseases.

Eruptions, indentations, excoriations, furrows, and fissures of the tongue are described, and figured in colored plates, which, though not masterpieces of art, show the conditions with tolerable accuracy. The subject of ulcers is pretty thoroughly exhausted in Chapter VIII. Many of the lingual ulcers are of traumatic origin, others dyspeptic, or due to gastric derangements, whilst syphilis in all of its stages furnishes examples. The tuberculous ulcer, whilst rare, is sufficiently recognized, and the suggestion is made to remove it, both to lessen local irritation and to prevent contamination of the system. The author even advises the removal of secondary tuberculous ulcers, if it can be done readily, in order to relieve the grievous local distress. Lupus of the tongue has been seen only a few times.

Tumors of the tongue form an interesting and important contribution to the work; those of a benign nature are rare, but are occasionally met

with, especially the fatty, fibrous, and telangiectatic. Sarcoma of the tongue has been seen but a few times, but epithelioma of the squamous type is sufficiently common, and is at this time especially held in remembrance on account of the recent case of General Grant, and more lately that of Mr. Wakley, editor of the *Lancet*. Cancer of the tongue is much more frequent in males than in females, which is to be expected, as men are exposed to the various exciting causes more than women. Mr. Butlin lays especial emphasis upon the danger of cauterizing the tongue. He says: "*If there be one thing more harmful than another in the treatment of simple indolent sores of the tongue in persons over thirty years of age, it is the application of a strong caustic.*" All warty growths upon the tongue should be removed as a prophylactic. When there is a suspicious surface upon the tongue, the scrapings should be examined microscopically, for if it is tuberculous it may be possible to find bacilli, and if cancerous distorted epithelium will be discovered. The author says, in regard to the prognosis of cancer, that " patients who are not operated on usually die within a year or eighteen months from the first appearance of the disease," and that " it may be taken for granted that a saving of 10 lives in 100 may be fairly claimed for operation in cases of lingual carcinoma." Nevertheless cancer of the tongue is one of the most malignant of all affections.

The different methods of removal of the tongue are thoroughly described, and a special chapter is devoted to the " choice of an operation." In this chapter are given the author's personal opinions as to the relative merits of different operative procedures. He says there are but few lingual carcinomata which cannot be removed through the mouth, and that there does not seem to be much difference in the rates of mortality of the different operations; personally he prefers Baker's method with the écraseur, or Whitehead's method with scissors in uncomplicated cases, whilst in complicated cases, one of the submental methods, as Kocher's, may be employed.

The final chapters are devoted to parasitic diseases and nervous affections of the tongue. In conclusion, we commend the work to the favorable consideration of our professional brethren, and would say to them, if there is anything you wish to learn about diseases of the tongue, read Butlin's book.   R. W.

TRAITÉ PRATIQUE ET DESCRIPTIF DES MALADIES DE LA PEAU. Par ALFRED HARDY, Professeur de clinique médicale à la Faculté de médecine de Paris, médicin de l'hôpital de la Charité, etc. 1 volume in 8vo de 1240 pages. Paris: Librairie J. B. Ballière et fils, 1886.

A PRACTICAL AND DESCRIPTIVE TREATISE ON DISEASES OF THE SKIN. By PROF. ALFRED HARDY.

A REVISION of this book as a whole, by summing up the special points of each chapter individually, gives one, as the chief common factor, the fixed idea of a diathesis, hereditary or acquired, as the fundamental cause of all diseases of the skin. This conception, arising from the tendency to generalization and theory natural to the French, and brilliant rather than scientific, originated with Alibert; and was sustained, after

his peculiar fashion, by Bazin. Hardy has never quite eliminated himself from the shackles forged by his predecessors and teachers. He represents the antiquated French school, and, were he less of a man, would represent that only. But a certain stubborn independence of character, and a temperamental nervous impatience of restraint, enable him, Janus-like, to present a face of recognition to the coming light while he yet turns another longingly backward toward the dark past. He admits tacitly the influence of Hebra upon modern French thought, as exemplified in the teachings of Vidal and Besnier, while a narrow pseudo-patriotism prevents him from subordinating theories, which are French, to science, which is only cosmopolitan. The light thrown upon obscure points of dermatology by modern histological investigation, is naturally somewhat dazzling to one whom we have seen make his diagnoses in dark basements by the aid of a single candle.

Hardy, furthermore, claims the credit of having been, with Bazin, the leader in establishing, pathologically, the doctrine of parasitism in skin diseases, and thus pointing the way to the discovery of the numerous morbific microörganisms of the present day, all of which he would place in the same category as the fungi of favus and of tinea. But Hardy, after all, merely followed the lead of Bazin; and all that even Bazin did, as original work, was to locate upon the hairless skin, as tinea circinata, in 1854, the trichophyton discovered by Gruby, in 1842, and described by Malmsten, in 1846, as trichophyton tonsurans of the scalp. The microsporon furfur of tinea versicolor was discovered in 1846 by Eichstedt, while the achorion of favus was discovered by Schönlein in 1839. We cannot then concede much originality to Hardy as a discoverer, even were we ready to admit his statement that bacilli *et id genus omne*, are only mushrooms.

And yet, when all this has been said, this volume remains the best work upon cutaneous diseases which has, as yet, appeared under French auspices. It is, however, a work for the library of the specialist rather than for that of the general physician. It is too diffuse, and based upon clinical, rather than upon pathological, observation. Quite comprehensive, and well arranged, therefore, though it be, so far as regards the consideration of external appearances, it necessarily considers many conditions which are purely symptomatic, trivial, and fugitive, and which cannot be regarded as true lesions of the skin; while, on the other hand, it lacks all mention of some of the important cutaneous maladies recently observed and differentiated from those previously recognized. Hardy poses as a specialist, but the aim of the specialist should be to condense, by elimination of the superfluous; intension rather than extension, quality rather than quantity.

In a work so clinical in its nature as this one is, we should expect treatment to be a strong point. From a believer in the constitutional nature of skin diseases we should expect to find stress laid upon internal treatment. And yet, when giving the treatment for ichthyosis, the author says "every internal remedy is useless and possibly harmful." Still, there are many valuable suggestions for treatment, which, we are pleased to see, are general, the book being entirely free from stereotyped formulæ and universal panaceas for the misuse of practitioners and the detriment of their patients.

A just criticism might perhaps be made that the author hardly shows sufficient acquaintance with the work of other laborers in the same field

at the present time, and has devoted too much time to attacking ancient views long since exploded and best at present entirely relegated to well-deserved oblivion. It is hardly necessary to-day to devote several pages to proving that rupia is not ecthyma. One regrets also to notice that the distinction between prurigo, a disease, and pruritus, a symptom, is by no means properly drawn and insisted upon.

The chapters upon deformities, or rather blemishes, of the skin is, because clinical, too extended; that upon the neuroses, on the contrary, is far too restricted in its scope. The family of the scrofulodermata is made the scapegoat for multifarious ills of the skin, a sort of dermatological cesspool. The chapters upon syphilis, on the contrary, are full, and the subject very generally treated of, as should always be the case in all works upon skin diseases.

While, therefore, considering the number of good treatises upon diseases of the skin, in the English language, we can hardly recommend this book to the general English-speaking medical public, it must be said that this is merely a relative condemnation. We are glad the book has been written; we feel that it will do good work in France; and it is cheering to see the Bourbon aspect of French dermatology at last undergoing some change and the specialty itself making progress.

E. W.

CLINICAL DIAGNOSIS: A HANDBOOK FOR STUDENTS AND PRACTITIONERS OF MEDICINE. By JAMES FINLAYSON, M.D., Physician and Lecturer on Clinical Medicine in the Glasgow Western Infirmary. Second edition. London: Smith, Elder & Co. Philadelphia: Lea Brothers & Co., 1886.

THE main interest in a new edition of a clinical manual is less in the amount of new matter which is incorporated, than in the fact that the material and the form in which it is presented give indications of the tendency of modern teaching, and, therefore, of the direction in which the study of medicine is progressing. In comparing this edition with the first, published eight years ago, a marked advance is evident. Not only has our knowledge increased largely by the accumulation of facts, but the methods of investigation and examination have improved. With this we find a clearer definition of terms, and a growing determination to rely more on facts and leave less to theory.

There is still in the profession a certain vagueness or looseness of expression, sometimes covering want of knowledge, sometimes used to lull the anxiety of friends whose confidence is increased by the nominal or apparent recognition of the ailment. This remnant of mediæval mysticism is in direct antagonism to the whole tendency of modern science in every branch. Why call a dyspeptic headache the result of "bile flowing to the brain," in deference to the ignorance of a patient who ascribes all indigestion to the liver; or state to the inquiring friends that a "wave of depression" is passing over the patient? Persons are naturally desirous to know what ailment a friend is suffering from, and are generally most easily satisfied by a term they can repeat, however little may be its signification. Where no definite name is reserved for the condition we are asked about, we are left to choose between a meaning-

less phrase, or an explanation of the state of the patient. The latter requires a more exact diagnosis and is thus rendered the more difficult.

Exactitude in diagnosis is evidently considered by some practitioners no part of their duty, but to be the exclusive business of the consultant; perhaps excess of work makes more than empirical treatment by them impossible. In such rapid practice, all that can be attempted is such diagnosis as results from noticing the appearance of the patient, and the state of his tongue and pulse; aided by such a history of the attack as can be furnished by the patient or his friends in a few minutes.

The faculty of rapidly grasping the significance of the aspect of the patient or his position—in other words, a knowledge of the physiognomy of disease—is important to every one; but any indications received in this way should receive confirmation from exact methods of examination before being accepted. This manual shows a just appreciation of the relative values of physiognomy and systematic examination in that it devotes the first chapter to the former, and then proceeds to give full instructions for an exact investigation of the condition of the various organs and functions. In this first chapter, written by Professor Gairdner, all the elements for a rapid guess at diagnosis are set forth, but with due warning that they are useless by themselves. The writer says:

"What the clinical observer has to do is not to grasp at a hasty generalization, but to note details of positive fact, and out of these to evolve the elements of a sure diagnosis. The statement that the patient has some peculiar and specific constitutional morbid tendency or bias is not, in any case, the statement of a fact, but of an opinion, and sometimes of a very insecure and fanciful opinion."

As the method of systematic investigation necessary for reliable diagnosis demands closer application and longer practice than are requisite for the learning of a few "tips," the student is liable to be turned from the proper study of the one by the alluring simplicity of the other. As Professor Gairdner remarks:

"The popular, and to a certain extent the half-educated, medical mind is always looking for a pathognomic sign, or a broad, striking, easy generalization from a few facts; whereas, it is only by ripened experience that we come to know gradually the real value of common and obvious, still more, of uncommon, and not obvious, facts *when seen in combination*, so as to form conjointly a basis for large inferences."

Nothing is so harmful to students as the practice, not yet obsolete amongst clinical teachers, of indicating the easy roads to diagnosis, prognosis, and even treatment, by the appearance of the tongue or the feel of the pulse. To the beginner, there is much that is attractive and seductive in a method that seems to give, in a few minutes, an insight into all that is worth knowing about a case; but when the student has developed into the practitioner, and is left without the physician's notes to aid his own observation, he finds his tips fail him sadly. The clinical instruction that in each case begins with the fact that the patient looks ill—always of first importance, though an apparent truism when the lecture is on a case of pneumonia in a hospital ward—and goes systematically through all signs and symptoms till at length a reliable diagnosis is reached, lays the foundation for a feeling of self-reliance which is invaluable in after-practice. The student may perhaps tire with the long enumeration of facts before the climax of diagnosis is reached, and

may consider the lecture tedious; the busy practitioner, a year or two afterward, would give much for an opportunity of hearing these same lectures again.

The clinical observer has to exercise the functions of counsel, judge, and jury in one. Facts that are apparent have to be noted, those hidden or disguised have to be elicited, the essential sifted from the unimportant, and the whole arranged with due significance attached to each: then with all the facts collected and arranged before the mind, and as the result of a "summing up" guided by past experience, a decision has to be arrived at and delivered as diagnosis, prognosis, and treatment. Clinical instruction should be directed toward helping the student to approach every fresh case with this object, and teaching him the means of collecting and arranging his facts. This is the plan of the present manual. It "does not aim at supplying any short and easy road to medical diagnosis; its object is to guide the student to a careful examination of the symptoms in his patient, and to supply information as to the methods and results of clinical investigation." In order to carry out this intention in the fullest manner, Dr. Finlayson has obtained the coöperation of certain specialists, who treat of their own subjects, viz.: insanity, gynecology, and the examination of the fauces, larynx, and nares.

Here again we have another sign of the immense strides medical knowledge has taken of late years. Special knowledge is now required for almost every organ, and no one man is able to master, and so to teach efficiently, every branch of medicine. Thus arises the demand for specialists; but just as a general knowledge is requisite in the specialist, so must the student study every branch of his profession. This division of work has many advantages, but it has also some disadvantages. The specialist is apt to attach undue importance to his own branch, to the extent, it may be, of slighting other equally important divisions of medicine. This fault shows itself to some extent in the present work.

The importance of including a study of insanity among the essential parts of a medical education is now fully recognized. There is, however, in the chapter on "Insanity" in this manual too great a tendency to make all peculiarities into forms of madness—a sort of authoritative confirmation of the saying that everyone is mad on some point. In a work devoted entirely to brain disease we are not surprised if every peculiarity of individuals is made to point to a moral: but in a student's manual of general medicine this gives the subject an undue prominence. Astraphobia and syphilophobia etc., sound unnecessarily serious when classed under the heading of "Partial Emotional Insanity." So too in the chapter devoted to the "Female Generative Organs," we find several common dyspeptic symptoms referred to uterine derangements, which are frequently associated with the latter, but the amelioration of which depends on no special uterine treatment.

The plan of the work is well followed out, and it is evident that the manual has undergone a very thorough revision in this edition. Many sections are entirely rewritten and much new matter is introduced, with the result of bringing the work up to date. Many new plates have also been added, some of them specially drawn for this book. The Appendix to Chapter I., on "Weights and Heights," is new and useful; as is also the paragraph on "Occupations Injurious to Health," on page 62. Twelve pages are devoted to "Febrile Rashes" in which measles, small-

pox, scarlet and enteric fevers are discussed. Tables are given for the time when the rash appears, for the incubation period of each, and of the liability to second attacks. Under the last heading we note that while one attack of enteric fever is barely allowed to be protective against a recurrence, the power of scarlet fever in this respect is overestimated. The other two tables lack the precision of which they are capable, and which would render both points of value for purposes of diagnosis and of hygiene. The incubation periods seem, in some cases, to be calculated from the appearance of the eruption as in that of smallpox and measles; in others, as in scarlet fever, from the beginning of the illness; we are left in doubt as to whether enteric fever and typhus are estimated by the former or the latter method or both in different ways. We are glad to see in the first of these tables, that the time for the eruption of varicella is given as the first day of fever; it might have been added that the first febrile symptoms are sometimes markedly severe. The rash of German measles should have been fixed for the second day—that is, the day following the first febrile disturbance. Where this has extended to the fourth day, measles may be suspected. The rash of septicæmia has not been mentioned among those that may simulate scarlet fever. The various roseolæ are well described and the rose spots found in cerebro-spinal fever are noticed.

In the scheme for Case-taking the omission to note the date—day of week and month—on which the patient sought relief is an oversight: the length of time the patient has followed his occupation might be included. In the respiratory system, hæmoptysis should have special mention.

As might have been expected from the rapid advance in the study of nervous diseases in the last ten years, and the greater exactness of observation which is now required in examining these cases, we find a large addition to the length of the chapter on "Nervous Diseases," which has grown from forty-seven to seventy-one pages. The section on "Reflexes" is added and makes the chapter more complete. We notice that hysterical paralysis is only just hinted at. It is rather a sign of the prominence given at the present day to nervous diseases that the chapters devoted to this branch, including the organs of special sense, fill almost as many pages as are devoted to the respiratory, circulatory, digestive, and urinary organs together.

The use of the sphygmograph has been considered so much more important than it was at the time of the first edition, that it is given at great length, and, together with the cardiograph, it is now placed in the section on "Physical Examination of the Chest." Apropos of the heart, functional or hæmic murmurs receive somewhat short notice; we doubt whether they are always ventricular-systolic in rhythm, though, undoubtedly, they usually are so. The methods of examination of the blood are given at greater length than in the first edition, and form a useful addition.

The section on "Jaundice" without obstruction is entirely rewritten to keep pace with scientific progress. The chapter on the "Urinary Organs" is enlarged and the newer tests for albumen and sugar are included. This is one of the best, as it is also one of the most important, chapters in the book.

On the other hand, the chapter on the method of performing post-mortem examinations, which formed a fitting ending to the first edition,

has been omitted in the new revision.   This is to be regretted.   It seems a pity that a somewhat philosophical chapter like that on the physiognomy of disease should be written in a style that is sometimes obscure, from the length of the sentences and the number of parenthetical phrases.   Here and there in the book we come across a Scotticism which has slipped in unnoticed.   The word *incipient*, which occurs somewhat frequently, might be allowed to drop out of medical terminology with advantage.   Its proper meaning of "*commencing*" is unobjectionable; but it is unfortunately used also in the sense of "*being present, but without showing any signs of its presence*," and thus is a convenient cover for a guess, which is hazarded without sufficient foundation in fact. "Incipient consumption" is a not uncommon "diagnosis" where a delicate patient, with no organic disease, is the subject of solicitude.   It is noticeable also that typhus is frequently used in this book as a type of an acute febrile illness.   Typhus is now by no means a common disease, and so is a bad one to choose as an example.   There is sometimes a suspicion that "typhoid" may have been intended, but it certainly is not so in many of the instances where "typhus" occurs.

A very marked improvement in this over the previous edition is the giving a good bibliography at the end of each chapter, instead of mentioning a few works in a foot-note at the commencement of each subject.

A very careful revision has, in fact, increased the value of a very useful work.

LECTURES ON DISEASES OF THE NOSE AND THROAT.   By CHARLES E. SAJOUS, M.D., of Philadelphia.   Illustrated with 100 chromo-lithographs from oil paintings by the author, and 93 engravings on wood.   8vo. pp. 439. Philadelphia: F. A. Davis, Att'y.   London: Cassel & Co., 1885.

THIS is a very fair exposition of the subject for the beginner and is much above the average of most elementary treatises on nasal and throat affections.   The more modern appliances employed in the diagnosis and treatment of this class of diseases are figured and their uses explained in a clear and concise manner, while a number of new instruments, or modifications of old ones, are added from the armamentarium of the author.   We are surprised that a Philadelphian should call the Fahnestock tonsillotome "Mathieu's," and should be apparently unfamiliar with the best of such instruments, the tonsil guillotine of Physick.

The methods of treatment are, as a rule, those usually resorted to by specialists in this country and may be safely followed by the student. The descriptions of diseased conditions are in many respects incomplete and superficial and important omissions occur which detract from the completeness and mar the symmetry of the volume.   Thus, for example, although nearly one-half the work is (very properly) devoted to diseases of the nasal passages, no reference is made, except incidentally in the chapter on "hay fever," to the nasal reflex neuroses, a subject which, above all others, is the burning rhinological question of the hour.

On page 138 the incorrect statement is made that Voltolini, in 1872, first showed that asthma arose from "pressure upon or irritation of the posterior ends of the turbinated bones."

One of the principal features of this book, and that which will perhaps attract most attention, is the pictorial. The colored illustrations vary in excellence. It may be said, in general, that those which represent the macroscopical appearances will be found of great value to those who desire to familiarize themselves with the morbid conditions which they indicate, and that they possess the additional advantage of originality. Those, on the other hand, intended to set forth the microscopical appearances (as, for example, the erectile tissue and atrophic rhinitis) do not present either in color or design even a diagrammatic resemblance to the original. Indeed, it may be said that the color of all the plates needs toning down and that they would be more true to nature if executed in less pronounced shades of red and blue.

We are sorry to find that certain incorrect statements and unsupported claims to originality made in the brochure of the author on " hay fever " are reproduced without alteration in the present volume. Dr. Sajous not only creates the impression, but makes the direct affirmation that the combination of the three prevalent theories regarding the disease was suggested by him in a paper read and published in 1883, whereas the latter contains no evidence whatsoever of such intention. The assertion that the combination of factors—i. e., the external irritant, the abnormal excitability of the nerve centres and sensitive area through which the system is influenced—was affirmed in his first article, not only, therefore, carries with it a wrong impression but seemingly invests the author with a sort of prescience which enabled him, in manifest and acknowledged ignorance of Beard's researches and long before certain more recent theories were propounded, to reconcile all with the pollen theory in the triumphant solution of the problem.

We can scarcely believe that Dr. Sajous is serious in his claim to priority in the matter of treatment by cauterization of the nasal mucous membrane, or, as he prefers to call it, " superficial organic alteration." As is well known to those acquainted with the literature of the question, this line of treatment had been distinctly laid down by others long before Dr. Sajous ever wrote upon the subject, and if the author's language be compared with that of those whose writtten and published contributions preceded his own clinical observations in the matter, it will readily be seen that the substitution of the ponderous phrase " superficial organic alteration " for the more commonplace term " cauterization " is but the trading of words in the interest of a distinction without a difference, and is eminently suggestive of the distance that separates Tweedledum from Tweedledee.

The observations of Dr. Sajous are interesting as giving support to one side of the present doctrine concerning " hay fever," but the historical facts in the case unfortunately exclude him from originality both in the matter of the pathology and the treatment of the disease.

We have refrained from going into an extended criticism of the author's claims and have made the above statements in the interest of historical accuracy and in simple justice to those from whose observations and experience the new conceptions of this affection have arisen. We have done so also in justice to the author, for in their uncorrected condition, his publications place him in the false light of a pioneer in matters in which he is simply and solely a follower.

On the whole, the book is written in an easy style, its general make-up is excellent, and we can cheerfully commend it to the student, who will find in it much practical information.   J. N. M.

The Science and Practice of Surgery.   By Frederick James Gant, F.R.C.S.   Third edition.   2 vols., 8vo. pp. 2185.   London: Ballière, Tindall & Cox, 1886.

The fact that a work of the magnitude of the treatise before us has reached its third edition, and that it has had an extensive circulation in America and the colonies, sufficiently attest the success which has attended it and the estimation in which it is held by the profession at large.

In the interval of time which has elapsed since the publication of the second edition of the work, in 1878, there has been, as Mr. Gant points out in his preface, "some positive advance in the frontier of the science, and not unfrequently corresponding achievements in the art of surgery, supplemented by the further teachings of experience."   Naturally, therefore, in bringing the work up to the standard of to-day, it has been found necessary to introduce much new matter, so largely adding to the size of the book, whilst the original text has undergone extensive emendation, each chapter bearing ample evidence of careful revision. Nevertheless the general arrangement of the work, which is simple and comprehensive, remains unchanged.   We need, therefore, but briefly notice some of the more important alterations and improvements which have found a place.

Amongst the subjects which have been dwelt upon more fully and treated at greater length, in this edition are those relating chiefly to inflammation, tumors, as including the sarcomata, wounds and the antiseptic treatment thereof, a section on microörganisms and their relations to the production of septic and other diseases—under the title of "Bacteria in Surgery"—having been contributed by Mr. Watson Cheyne.   Neuropathology and the surgery of the brain, the operative treatment in reference to cerebral localization being fully discussed and explanatory diagrams appended; excisional surgery and osteotomy, abdominal surgery, and intestinal obstruction; much new matter in connection with the surgery of the kidneys and viscera having been incorporated; and diseases of the genito-urinary organs, the treatment of which constitutes a somewhat special feature of the work.

In more special departments Mr. Gant has invoked the aid and skill of Mr. Henry Power, Mr. Laidlaw Purves, and Mr. Charles L. Tonces, who, respectively, have written the chapters on "Diseases of the Eye, the Ear, and the Teeth."   Dermatology has been ably and concisely dealt with by Mr. Malcolm Morris.   Dr. Morell Mackenzie contributes the section on "Diseases of the Larynx," Dr. Robert Barnes that on "Diseases of the Female Genital Organs," whilst Mr. William Adams treats of "Deformities," as including orthopædic surgery and lateral curvature of the spine; and Mr. William Rose has revised the sections upon "Cleft Palate and its Treatment."   The ability of these "literateurs" to discuss the subjects which have been allotted them is so generally recognized, that criticism of their work is unnecessary; curious errors have, however, sometimes crept into the text; for instance, we find in the section on "glaucoma," reference to the closing "of the lacunar system, known as the *canal* of Fontana," the canal of Schlemm being evidently meant.   We regret, also, that more care has not been exercised

in the production of the illustrations of the fundus and its diseases, these being anything but satisfactory.

Of Mr. Gant's work, as a whole, we can but speak in terms of commendation. Throughout it bears the impress of the matured thought and deliberation, of the critical judgment in the treatment of disease, which one would expect to find reflected from a mind stored with the teaching of a long experience. Mr. Gant is always "readable," often highly original, but occasionally his descriptions of the pathology of disease, upon the importance of which he rightly lays so much stress, is hardly commensurate with the more recent advancements in that direction. Thus, in the chapter on tumors, the classification of the varieties of cancer is given as follows: "Cancer comprises three typical species; encephaloid, scirrhus, and, perhaps, colloid with many sub-varieties; distinguished chiefly by shades of difference in their general characters of color, consistence, shape, size, and mobility. Epithelial cancer, as another form of this growth, is taken separately. The insufficiency and looseness of such a classification are at once obvious, stereotyped, though it may be in older text-books. Under which heading are cancers of the thyroid gland, or of the kidney, or of the ovary, etc., to be placed? Again, no reference to tuberculosis as a cause of joint diseases is mentioned, such affections being included under the general designation of scrofulous inflammation or scrofulous diseases of the joints.

The author's reading has been wide and varied, and his criticisms of views, other than his own, on debateable questions, are generally excellent. It may here be mentioned that Mr. Gant cites as an example of pyæmia the case of William the Third, who fell off his horse and fractured his clavicle; at least, so he interprets Lord Macaulay's graphic account of the death of that king, and, we think, with every probability of truth.

The work is contained in two large volumes, the type and printing being all that can be desired. The illustrations, which amount to one thousand and ninety, are, with certain exceptions, very good, while the index to each volume is full and complete.

In conclusion, we cannot but congratulate Mr. Gant upon the successful issue of the third edition of this work, which to him must have been a labor of love, and is alike creditable to the author and publisher.

RECENT WORKS ON NERVOUS DISEASES.

OF late years the subject of neurology has advanced in a most striking and marvellous manner. A generation ago the very axioms of nerve

pathology were barely outlined. Glimmerings of truth may be found here and there in the works of some of the great masters of our art, who have long since passed away. But with Duchenne a new era began. The pathology of the nervous system became fixed on a sure basis. The methods of research were strengthened and modified by science.

Since Duchenne's time the advance has gone on, slowly at first, but within the last decade at a speed almost bewildering in its impetuosity. Three works, epoch-making works, written by men whose names are almost as household words in medicine, form the subject of our review. It would be impossible to discuss these works in anything like detail. They embrace the entire field of nervous diseases both clinically and pathologically, and on this account their intrinsic value can only be appreciated by the reader himself. The development of our knowledge in this branch of medicine, to which we have alluded already, is at once evident on perusing any one of these three works. Gowers's book, which is a compendium of our existing knowledge of the diseases referable to the spinal cord and nerves, may, for the sake of convenience, be discussed first. But to call it a compendium or compilation is scarcely justice to the author, who himself has contributed so much to our standard knowledge of nervous diseases.

On the nature and significance of the tendon reactions most authorities are not yet agreed. The arguments against the reflex view are stated with great clearness and precision by Gowers. The shortness of the interval between the tap on the tendon and the muscular contraction seems almost conclusive against the theory that the phenomenon depends on a simple reflex action. Gowers believes that the contractions are local, but that a reflex influence is also concerned in their production. " If we regard the contractions as local we have still to account for the irritability which permits the local stimulus to cause a contraction. This irritability is developed by passive tension. . . . Hence I have suggested that the tension excites, by a reflex influence, a state of extreme irritability to local stimulation."

Great prominence is given by Gowers to the subject of peripheral neuritis, and probably no better account exists in any of our text-books on nervous diseases. There is little doubt that many of these conditions, which were quite lately ascribed to spinal affection, are really dependent on disease of the peripheral nerves.

In this connection it is interesting to compare the views of Bastian on so-called alcoholic paralysis. He says (pp. 596 and 597): "all these divergences of result and opinion decidedly strengthen me in my notion that the name 'alcoholic paralysis' is an unfortunate one; that at present there is no one condition which answers to this name; and that its adoption will tend to encourage the making of an easily arrived at, slip-shod diagnosis, or what seems to be such, when in reality no diagnosis in the proper sense of the term has been made. There is great danger, in fact, that the term 'alcoholic paralysis' may soon come to be just as meaningless, and, it may be added, erroneous, as its compeer 'hysterical paralysis' is too often found to be." This warning is not inopportune, although possibly few will be inclined to coincide fully with the views of Dr. Bastian. The nervous symptoms of a paralytic nature induced by alcohol certainly differ widely in their nature and in their grouping; but that such and such symptoms are due to alcoholism may usually be asserted with confidence. This, in itself, is an advance

on our former notions, and has a modifying influence of the greatest importance on prognosis and treatment.

Our knowledge of the various physiological tracts in the spinal cord is far from complete. Thanks to the early efforts of Ludwig Türck, and, of late years, to the elaborate researches of Charcot, the course of the voluntary motor impulses in the brain and spinal cord has been defined with great accuracy. The functions of the posterior columns and the conditions under which they become degenerated are known with scarcely less precision. But there still remains a *terra incognita* in the spinal cord. Until quite lately, the functions of that large tract of white matter lying between the crossed and direct pyramidal tracts were a matter of speculation. Then Flechseg, by the developmental method, gave us the direct cerebellar tract.

Later, Woroscheloff's experiments appeared to indicate that sensory impressions are conducted through the anterior mixed region of the lateral columns. In 1877, Gowers figured a tract, presumably sensory, in the artero-lateral region, and, a little later Hadden described symmetrical tracts of degeneration in almost the same position. Observations of Westphal, Tooth, Strümpell, and others, have recently appeared in corroboration. It is interesting, too, that within the last few months Bechteren has confirmed the existence of this tract by his researches into the development of the spinal cord. It is fair to add that so long ago as 1867 Bastian figured and described areas of degeneration, "adjacent to, and more or less continuous with, the direct cerebellar tract." On this point he says (p. 516):

"My own observation leads me to believe that considerable variation often exists in regard to the exact disposition of this lateral sensory tract and of the direct cerebellar tract, as well as in reference to their exact relations to one another."

With the recent developments of our knowledge of the physiology and pathology of the spinal cord, new types of disease appear to be evolved. An instance in point is Charcot's amyotrophic lateral sclerosis, formerly confounded with progressive muscular atrophy or primary lateral sclerosis. It would seem, from the writings of this celebrated observer, that there is really a morbid state having the characters which he describes. Gowers, however, is not of this opinion. An observation on p. 373 is to us startling in its novelty, and certainly does not coincide with generally accepted notions. He says:

"I have not yet met with a single case of progressive muscular atrophy in which the pyramidal tracts were unaffected."

Again (p. 378) he observes:

"It is probable that the pyramidal tracts are degenerated, if not constantly, at any rate in such a very large proportion of the cases of progressive muscular atrophy that Charcot's distinction is in effect giving a new name to an old disease."

Bastian too, although describing amyotrophic lateral sclerosis in full, seems to suspect the position assigned to it by Charcot. He remarks that it "might perhaps be regarded as a mere variety of 'primary lateral sclerosis.'"

That the evidence adduced by Gowers in favor of a distinct morbid

condition which he terms "ataxia paraplegia," seems open to the same objections which he himself urges against amyotrophic lateral sclerosis.

The occurrence of degeneration in the lateral columns is not very uncommon in what might be termed typical tabes dorsalis. Dr. Gowers, however, states his views and "his facts" with great clearness, and it is quite possible that the affection he describes is a distinct type.

Dr. Bastian's work differs materially both in scope and in arrangement from that of Gowers. It practically embraces the entire domain of cerebral and spinal diseases. To some the omission of treatment may appear a drawback, and we must confess that in our opinion it is so. Apart from this, the work fully sustains the great reputation of the author. The chapters on the varieties of aphasia and on cerebral localization are perhaps the best in the book.

It would be difficult to speak too highly of Ferrier's work. Although a second edition, it has been much enlarged and almost entirely re-written. Many of his well-known experiments have been repeated and extended. In some respects, too, his conclusions have been modified, mainly in accordance with the more recent researches of Horsley and Schäfer. It is still a question as to how far the doctrines of cerebral localization, as deduced from the conditions found in lower animals, can be extended to man. The results of experiments have, to some extent, been confirmed by observations on man, but corroboration is still necessary before *la belle doctrine* of cerebral localization can be applied to man in its entirety. This consummation is probably not very distant. The recent brilliant results in brain surgery recorded by Horsley seem to be the first fruits of Ferrier's lifelong labors.

A few final words on the relative merits of these three works.

Gowers's volume is probably the most concise text-book extant. The illustrations are admirably executed by the phototype process. The classification of the contents and the general arrangement of the text are especially noteworthy. We anticipate with pleasure the appearance of the second and final volume, which will deal with diseases of the brain and general diseases of the nervous system.

For diagnosis, Bastian's work will take the highest rank. It is remarkable for its philosophical tone and for the author's critical comments on numerous obscure problems on neurology.

We have already spoken in the highest praise of Ferrier's book, and we need only add that we welcome this volume as the most complete and original work of its kind in existence.

INDEX-CATALOGUE OF THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE, UNITED STATES ARMY. AUTHORS AND SUBJECTS. Vol. vii. INSIGNARÈS—LEGHORN. 4to. pp. [100] 959. Government Printing Office, Washington.

THE steady issue of the successive volumes of this great work, continues to be a matter of congratulation to every medical scholar, and to every American physician possessed of a proper share of national pride. Yet this steady issue is slow, and we find ourselves longing for the power to expedite the enterprise.

The progress of the work has made necessary a condensed list of the abreviations used in the first seven volumes, and this list alone occupies one hundred pages. This list gives some idea of the enormous scope of the work, and of the very extended research which has been carried on in connection with its preparation. But it may help those of our readers unfamiliar with the work, to arrive at a more definite idea of its size when they are told that the volumes thus far issued refer to 73,574 authors, to 39,252 volumes, and 59,997 pamphlets, and that its subject-titles include the names of 70,513 books and 254,057 journal articles. Certainly no other book in this country presents such stupendous figures or gives evidence of such exhaustive, systematic, and careful labor. Volume vii. contains about the same amount of titles as each of its predecessors. We notice that no less than sixty-one pages are devoted to an enumeration of titles under the heading "intestines."

To analyze such a book is of course impossible, and there is nothing for it but to reiterate the same expressions of admiration by which we have, on other occasions, shown our appreciation of the energy, perseverance, and literary skill which led to the conception of the work, and have characterized its prosecution. Dr. Billings may very properly be again congratulated upon the progress made. S. A.

A Reference Handbook of the Medical Sciences, Embracing the Entire Range of Scientific and Practical Medicine and Allied Sciences. By various writers. Edited by Albert H. Buck, M.D. Vol. i. 1885, pp. vi. 808; vol. ii. 1886, pp. 814. New York: Wm. Wood & Co.

In his preface to the admirable dictionary for which he is responsible, the Editor states the reasons which have governed him in the selection of topics, and the space allotted to the discussion of each. He has preferred, and we think wisely, to run the risk of allowing the reader to search in vain now and then for information in regard to some topic in which he is interested, rather than to extend the list of topics, under the necessity of producing articles so brief and so lacking in detail, as to give rise to disappointment.

The selection of topics has apparently, on cursory inspection, been made with deliberation and judiciously, and their relative space fairly proportioned; as indeed Dr. Buck's experience in this department of literature would naturally lead us to expect. The arrangement is purely alphabetical. The first volume extends from "Aachen" to "Cataract" (inclusive), the second volume opens with "Catarrh, Nasal," and concludes with "Eye." The list of authors is very long, and includes many distinguished names. The work of the authors appears to be well done. The type though small, is clear, and the proof-reading has been excellent. The illustrations are fair, and some are even above the average. This is a matter of congratulation in the present stage of commercial book-making, for illustrations which are positively misleading are far too common. Better no pictures than poor ones.

Detailed criticism of the text of the work is, of course, out of the question, but some random illustrations of its scope and character may be given. Thus the article on "Alimentation, Rectal," includes the

topic of "Rectal Medication," and occupies two and three-fourths columns, of about 700 words to the column. "Alicante" and "Alhama d'Aragon" take a column between them, the latter's share being just seven lines. The "Alps" are disposed of in fifteen lines; "Alteratives" are discussed to the extent of a column; the subject of "Ambulances" has nearly twelve columns; that of "Amputation" has sixty-two columns—*i. e.*, thirty-one pages. Some of the wood-cuts supposed to elucidate the latter article are bad enough.

The work will be completed in eight volumes, and a full index with cross references will accompany the last volume. It will be a highly useful addition to the "busy practitioner's" library, and the student will find in it much of value conveniently arranged, and tersely stated.

S. S. C.

A Manual of Surgery. In Treatises by Various Authors. In three volumes. Edited by Frederick Treves, F.R.C.S., Surgeon to and Lecturer on Anatomy at the London Hospital. Vol. I., General Surgical Affections, The Bloodvessels, The Nerves, The Skin. Vol. II., The Thorax, The Organs of Digestion, The Genito-urinary Organs. Vol. III., The Organs of Locomotion and of Special Sense, The Respiratory Passages, The Head, The Spine. Duodecimos, 1866 pages, 213 engravings. Philadelphia: Lea Brothers & Co., 1886.

These volumes consist of brief practical essays up to the times, and presenting the more modern and advanced views. They are, in large measure, written by the younger English surgeons, by men who are now rising into prominence, and whose names are daily becoming more familiar to students; but some of the papers are from older hands, such as Mr. Jonathan Hutchinson and Sir William MacCormac. While the papers are by no means superficial, neither are they exhaustive, but go over the ground allotted to them with sufficient fulness to meet the requirements of every-day surgical practice. In doing this they accomplish the end in view, which, as the accomplished Editor informs us, is to present "a concise account of the leading facts and principles of modern surgery." Operative surgery and pathology are not prominently dealt with as a general thing, the aim of the book being rather to present the clinical, diagnostic, and therapeutic aspects of surgery. Yet the general principles involved in operations are considered, and some special procedures, such as tracheotomy, gastrostomy, and nephrotomy, are dwelt upon with minuteness of detail.

Taken as a whole, this book is fairly representative of English surgery, and well suited to the wants of students who desire to obtain a general view of the subject-matter, but it can by no means take the place of more extended treatises. We are fond of small books and fully recognize the advantages possessed by such, but we confess to some surprise that either editor or publisher should have consented to divide a manual into three volumes, when the matter could have been readily included in one of not unmanageable size. Each volume is, of course, handy and most convenient for the pocket, but the three together are by no means as easily managed as one larger volume. More especially is this the case with a work which covers so wide a field, and which is, therefore, deservedly entitled to be used as a work for ready reference. S. A.

ÉTUDES CLINIQUES SUR LES MALADIES DES FEMMES. Par le Dr. HENRI SCHAFIER, Ancien Interne de l'Hôpital Rothschild. 8vo. pp. 276. Paris: G. Steinheil, 1886.

CLINICAL STUDIES OF DISEASES OF WOMEN. By HENRI SCHAFIER, M.D.

THE object of this work, says the author in his preface, is to prove by the clinical records of numbers of cases, that the vast majority of ill-defined nervous and dyspeptic symptoms which women so often manifest, depend upon some pathological condition of the genital apparatus.

As an introduction to these clinical studies, the first chapter is devoted to "The Physiological Menstruation; that phenomenon being explained by a new theory." To this chapter one turns with some curiosity, hoping to have new light thrown upon a much vexed question, only, however, to be disappointed. The "new theory" is as follows: "Every month, two or three days before the appearance of the menses, the genital apparatus becomes the seat of a considerable hyperæmia; the ovaries, broad ligaments, round ligaments, the tubes, and the uterus are much congested. This hyperæmia, which goes on increasing, creates a state of irritation which, limited at first to the organs of the pelvic region, soon extends itself to the entire organism. The nerve filaments of the great sympathetic, implicated in this general orgasm, act upon the terminal ends of the bloodvessel walls, dilating them and finally bringing about the escape of blood." This is not very clear, and the author fails to make it more so by his further explanation that "The action of the sympathetics is to open the terminal orifices of the uterine vessels," whatever that may mean.

In the description of the anatomy and physiology of the genital organs occurs this passage, "The uterus, the organ in which the ovule arrives, and in which occurs its fecundation, after it has met the male's fecundating germ," an assertion that will not find general acceptance.

The clinical studies, which follow, were evidently made by a physician and not by a surgeon; for instance, considerable space is allotted to the description of "ulceration of the cervix" and its accompanying reflex nervous symptoms, and one obstinate case associated with diabetes is recorded at great length, but nothing whatever is said of lacerated cervix or its treatment, in this connection.

In the chapter on dysmenorrhœa, another new theory is advanced, namely, that "Any perverted nervous action on the uterus can change its alkaline secretion to an acid one; this acid secretion clots the escaping blood, which becomes a foreign body in the uterus, and is the most common cause of dysmenorrhœa." To this acidity is also attributed the sterility often accompanying dysmenorrhœa, the acid killing the spermatozoa.

Great prominence is given to the "utero-ovarian" centre in the hypogastric plexus of the sympathetic, and the most diverse results are ascribed to its irritation: hypertrophy of the uterus, atrophy of the uterus, sympathetic paralyses, disturbances of menstruation, are all due, according to Dr. Schafier, to irritation of this centre.

The cases recorded throughout the book are such as are familiar to every practitioner, while the triumphant results of Dr. Schafier's treatment, after other physicians had failed, are recorded with disagreeable frequency. On the whole, the book will hardly repay serious study.

B. C. H.

QUARTERLY SUMMARY

PROGRESS OF MEDICAL SCIENCE.

ANATOMY.

UNDER THE CHARGE OF

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THE NEURAL SPINES OF THE CERVICAL VERTEBRÆ AS A RACE-CHARACTER.

More than thirty years ago, it was pointed out by Owen that the neural spines of the cervical vertebræ in the skeletons of an Australian and a Bushman differ from those of the European in not being bifid. To ascertain the value of this character, DR. J. CUNNINGHAM has compared the cervical spines in fifteen Europeans and twenty-four individuals of lower races, including Australians, Negroes, Andamanese, Tasmanians, and Esquimaux, with the following results: 1. The spine of the seventh cervical vertebra is never bifid, and the sixth is rarely cleft even in the European. 2. The spine of the axis is regularly bifid in all the races examined (only one exception in a Negro). 3. The spines of the third, fourth, and fifth vertebræ are, with few exceptions, bifid in Europeans, but simple, as a rule, in the lower races. 4. The spines that are least frequently bifid in the lower races are the third and fourth, which are also the most stunted of the series. This arrangement allows a greater freedom of movement in the neck in the direction of extension.—*Journal of Anatomy,* July, 1886.

ON THE MORPHOLOGY OF THE CARPUS AND TARSUS.

H. LEBOUCQ gives, *Anatomischer Anzeiger,* No. 1, June, 1886, his views of the morphology of the proximal constituents of the carpus and tarsus. He confirms Bardeleben's statement as to the existence in the human fœtus of a cartilaginous representative of the os trigonum, which is, however, not differentiated until later than the surrounding elements: but he agrees with Baur in regarding the astragalus as the intermedium, while the os trigonum with the posterior peroneotarsal ligament (posterior fasciculus of the external lateral ligament of the ankle-joint) are together homologous to the triangular fibrocartilage of the wrist-joint.

The cartilaginous calcaneum is divided into two parts, proximal and distal,

the former becoming the tuberosity; a considerable bloodvessel, which subsequently gives rise to Hyrtl's artery of the sinus tarsi, traverses the space between the astragalus and calcaneum; in the hand a similar perforating vessel runs between the lunar and pyramidal. It is thence concluded that the pisiform and proximal calcaneum, the pyramidal and distal calcaneum, the lunar and astragalus are respectively homologous. The carpal scaphoid is composed of radiale and centrale, and the tarsal navicular of centrale and tibiale (tuberosity), the second component being the less developed in each.

Like Baur, Bardeleben, and Albrecht, Leboucq is of opinion that the typical hand is not pentadactyle, and that the pollex or hallux in mammals represents the original second digit. He believes that in mammals a reduction has taken place on the preaxial, in batrachians on the post-axial side.

The ossification of the carpus and tarsus has been studied in a large number of subjects by Ch. Debierre in the *Journal de l'Anatomie et de la Physiologie*, May, 1886, and the following dates indicate the period at which he finds that the nucleus of each bone generally makes its appearance: Magnum, 11 to 12 months after birth; unciform, 12 to 14 months; pyramidal, 3 years; lunar, 5 to 6 years; trapezium, 6 years; scaphoid, 6 years; trapezoid, 6 to 7 years; pisiform, which is developed from two centres, 10 to 12 years. Calcaneum 5th, and astragalus 6th month of fœtal life; cuboid, at time of birth; external cuneiform, 12 to 15 months after birth; internal cuneiform, 2 to 3 years, and middle cuneiform a very little later; navicular, 4th or 5th year; epiphysis of calcaneum, 10 to 12 years.

Debierre considers that the primitive pentadactyle appendage comprised two basal elements for each digit, so that the typical carpus or tarsus consists of a proximal and distal row of five bones each, a condition which is met with in the carpus of the mole. The five elements of the first row of the carpus become the scaphoid, lunar, pyramidal, and pisiform, the latter being originally double, as is shown by its mode of ossification; and those of the second row, the trapezium, trapezoid, centrale (which has become displaced and gained a position between the two rows), magnum and unciform. The proximal elements of the tarsus are navicular-scaphoid, astragalus-lunar, trigonum-pyramidal, and calcaneum-pisiform; those of the second row, internal cuneiform-trapezium, middle cuneiform-trapezoid, centrale-centrale, external cuneiform-magnum, and cuboid-unciform. The tarsal centrale has undergone a still greater displacement than its carpal equivalent, and is represented by the cartilage on the tibial side of the navicular in some rodents.

ON THE RELATIVE DEVELOPMENT OF THE MALLEOLI.

C. Gegenbaur (*Morphologisches Jahrbuch*, August, 1886) directs attention to the difference in the relative size of the two malleoli in the fœtus and adult. In the fifth month of fœtal life the tibial malleolus is more prominent than the fibular. In the seventh month the two are of equal length; and from this time onward the fibular malleolus exceeds the tibial. The primitive condition agrees with that in apes, where the fibular malleolus never exceeds the tibial. The preponderance of the external malleolus in man gives greater firmness to the ankle-joint, and has been acquired with the assumption of the erect posture.

The Mechanics of the Skeleton of the Foot.

G. Hermann von Meyer (*Statik und Mechanik des menschlichen Fusses*, Jena, 1886) devotes the second part of his studies on the human foot to an elaborate analysis of the construction of the foot skeleton in relation to its function as an organ of support and locomotion. Starting from the principle that the foot is not a single apparatus serving various purposes, but rather a complex of several apparatuses which result from different methods of grouping its individual elements, he proceeds to show what parts of the skeleton are directly involved in each of the chief modes of resting the foot on the ground, and how the apparatuses thus formed are adapted to receive and transmit the weight of the body. He then develops in a similar way the action of the foot in progression.

It is first shown by experiment that the supporting arch of the foot is formed essentially by the third metatarsal bone, the external cuneiform, the cuboid, and the os calcis. The arch is strengthened and completed by the astragalus and navicular, since a part of the counter-pressure acting on the anterior pillar is transmitted through the external cuneiform to the navicular, from which it is conveyed by the astragalus to the os calcis. The weight of the body is therefore supported, when it descends vertically through the leg to the foot resting on a level surface, by an arch of the bowstring type, composed of the astragalus, os calcis, cuboid, navicular, external cuneiform, and third metatarsal bones. The other metatarsal bones form lateral buttresses to the primary arch, and are called into play when the weight, instead of being transmitted vertically to the foot, presses more on the one side or the other, or when the supporting surface is inclined. In standing on the great toe, the ankle is extended to the utmost, the great toe is drawn outward and backward by the action of the peroneus longus, and the inner portion of the tarsus is strongly arched, the weight being transmitted through the astragalus, navicular, internal and middle cuneiform, and first metatarsal bones. In standing on the smaller toes, the outer edge of the foot is drawn inward and downward by the tibialis posticus, and the weight is borne mainly by the astragalus, navicular, external cuneiform, and third metatarsal bones; to a less extent also by the middle cuneiform and second metatarsal bones on the inner side, and by the os calcis, cuboid, and fourth metatarsal bones externally. In the last two attitudes the tarsal and metatarsal bones by which the weight is supported form a curved pillar comparable to the lumbar portion of the spinal column. It is demonstrated that the numerous ligaments of the foot are disposed so as to meet the strain falling upon the several bones in the above three positions.

In progression, the foot is first raised upon the smaller toes by the action of the calf muscles and the muscles passing round the malleoli: and then the weight is thrown inward on the great toe by the further contraction of the peroneus longus. The third and most important element in the propulsion of the body is a forcible push against the ground by the phalanges of the great toe under the influence of its flexor muscles, aided by the rapid extension of the ankle. In different modes of progression these three acts are variously combined and have different values. The pushing action of the great toe is especially hampered by the wearing of narrow and pointed boots.

On the Movements of the Diaphragm, and their Influence upon the Abdominal Viscera.

C. Hasse has studied experimentally on the cadaver the movements of the diaphragm and the influence which they exercise upon the adjacent abdominal viscera. His procedure consisted in measuring the extent of downward movement of certain definite spots on the under surface of the diaphragm during inflation of the lungs, and in imitating the natural action of the muscle by an apparatus of small cords and pulleys, exercising traction upon the central tendon in the direction of the fleshy fibres. The results obtained are summed up as follows:

The contraction of the fibres of the diaphragm causes a flattening of the right and left vaults of the muscle; and the central part of the tendon also descends, but to a less extent than the lateral portions.

As was first shown by Duchenne, the diaphragm elevates the sternum and lower ribs, and thus enlarges the base of the thorax.

The peripheral part of the diaphragm is separated from the thoracic wall during the action of the muscle, causing an expansion of the complementary sinuses of the pleura.

The positive intra-abdominal pressure is increased during the descent, and diminished, but not destroyed, during the ascent of the diaphragm.

The changes in form of the diaphragm are accompanied by corresponding changes in the shape of the liver, stomach, and spleen.

By the contraction of the diaphragm the resistance to the flow of the blood in the liver and spleen is diminished, and the circulation through those organs takes place more freely as the movements are more extensive.

The movements of the diaphragm have an important influence on the flow of the bile, and promote the passage of the contents of the stomach and intestine.—*Archiv für Anatomie*, August, 1886.

On the Extensor Proprius Digiti Medii and Peroneus Digiti Quinti Muscles.

Wenzel Gruber continues his series of statistical researches on human myology, dealing in the seventh part of his *Beobachtungen aus der menschlichen und vergleichenden Anatomie* (Berlin, 1886) with the anomalous extensor proprius digiti medii and peroneus digiti quinti muscles. The extensor digiti medii was found, in 600 subjects, in 2.5 per cent. of the whole number of arms. It occurs in two forms, viz.: as a forearm muscle, arising from the ulna and interosseous membrane, in nearly 1.5 per cent., and as a short muscle confined to the hand, arising in the neighborhood of the wrist-joint, in 1 per cent. As a very rare variety both forms coexist in the same arm. The frequency was greater in the male than in the female, in the proportion of nearly 5 to 1.

The various forms and the frequency of occurrence of the peroneus digiti quinti were determined in 500 subjects. Of the 1000 limbs, the muscle was represented in 58.9 per cent., and absent in 41.1 per cent. It was very rarely met with as an independent muscle (0.3 per cent.), as a doubling of the peroneus brevis (0.2 per cent.), as a supernumerary head of the latter (0.1 per cent.),

or as an offset of the same muscle in the leg (0.4 per cent.). In most cases it appeared as the well-known slip from the tendon of the peroneus brevis in the foot (57.8 per cent.). In seven instances the tendinous slip on the back of the foot was provided with a small fleshy belly, and in one other the muscle was reduced to a special extensor proprius digiti quinti arising from the os calcis. The slip ended, for the most part, by joining the long extensor tendon of the little toe, but in some cases it was inserted into the capsule of the metatarso-phalangeal articulation, the fifth metatarsal bone, or the fascia covering the outermost dorsal interosseous muscle. In 80 extremities in which the peroneus digiti quinti existed, there was also a peroneo-calcaneus externus, from which Gruber concludes that the two are not different forms of the same muscle, as stated by Testut.

The Epiblastic Origin of the Genito-urinary System.

The idea that the epithelial elements of the genito-urinary system are de-rived from the epiblast was originally suggested by His, whose views received the support of Waldeyer. Hensen was, however, the first to show, in the rabbit, the manner in which this takes place, namely, by the separation of a portion of the epiblast immediately external to the protovertebral somites. In 1884 Spee gave a detailed account of the direct origin of the primitive uro-genital mass from the epiblast in the guinea-pig; and now W. FLEMING pub-lishes observations on the early embryo of the rabbit, which are in complete agreement with Spee's description of the development of this system. The epiblast over the intermediate cell-mass becomes thickened, and projects toward the mesoblast, forming the *uro-genital ridge*. The latter increases in size, becomes separated from the superficial or epidermic layer of the epiblast, and then fuses with the subjacent intermediate cell-mass. The development proceeds from before backward, so that in the same embryo the anterior sec-tions show a more advanced stage than those nearer to the tail, and the changes take place very rapidly. That the uro-genital ridge is of epiblastic origin, and not composed of adherent mesoblastic cells, is shown first by the disposition of Hensen's membrana prima lining the deep surface of the epiblast, which can be followed on to the corresponding surface of the ridge, separating it from the mesoblast; and, secondly, by the condition of the cell-nuclei of the two layers during the growth of the ridge, those of the epiblast exhibiting signs of great activity, and being met with in all stages of karyokinesis, while the mesoblastic nuclei are generally quiescent.—*Archiv für Anat.*, Aug. 1886.

The Collateral Circulation after Ligature of the Subclavian Artery.

HANS STAHEL describes the condition of the vessels in a case in which the subclavian trunk had been ligatured, and prefixes an account of some anasto-moses not mentioned in the current text-books, which may be of service in setting up the collateral circulation after this operation.

The latter are—1, an anastomosis between a scalene branch of the subcla-vian and the posterior scapular artery; 2, a subacromial loop between the suprascapular and acromio-thoracic arteries; 3, anastomoses in the skin be-tween branches of the transverse cervical, suprascapular, superficial cervical, acromio-thoracic, and posterior circumflex arteries; 4, an anastomosis between

the acromio-thoracic and coracoid branches of the axillary artery; and, 5, anastomoses between the anterior circumflex and superior profunda arteries. In the specimen dissected, the calibre of the subclavian artery was much reduced beyond the scalenus anticus muscle, whence it is inferred that the vessel had been tied antiseptically (probably with catgut), and that the ligature had been absorbed before the lumen of the vessel became obliterated by the adhesion of its walls. The collateral circulation was established mainly by the enlargement of the suprascapular and dorsal scapular arteries, the former being fully three times the normal size, also of the anastomoses of the scalene artery with the posterior scapular, and of the acromio-thoracic and long thoracic arteries with the internal mammary, as well as to a less extent through the anastomoses of the acromio-thoracic artery with the thoracic branch (Cruveilhier) of the posterior scapular and the superior intercostal arteries. In conclusion, the author discusses at length the mechanical conditions determining the varying degree of dilatation of the several branches of the subclavian.—*Archiv für Anatomie*, April, 1886.

PHYSIOLOGY.

UNDER THE CHARGE OF

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THE INFLUENCE OF LIGHT ON THE DEVELOPMENT OF BACILLUS ANTHRACIS.

M. S. ARLOING has performed some experiments on the influence of light on the bacillus anthracis, with the object of testing the work of Messrs. Down and Blunt and other observers. He presents the following conclusions, which are in the main confirmatory of those already arrived at:

1. Gaslight slightly injures the vegetation of bacillus anthracis. 2. Sunlight rapidly suppresses the vegetability of the spores, if the rays can easily penetrate the liquid medium holding them in suspension. 3. Sunlight gradually diminishes the vegetability of the mycelium and may modify the cultures as surely as heat. 4. These effects can only be obtained by composite white light, and not by any of its single constituent rays. 5. The effects occur in proportion to the intensity of the rays, and the transparency of the medium. 6. Light is a very important biological agent in the life of the "infinitely little." 7. Light is probably a factor in the mitigation of many, if not all, forms of virus.—*Archives de Physiologie*, April 1, 1886.

THE CHARACTER OF THE MUSCULAR CONTRACTIONS EVOLVED BY
EXCITATION OF VARIOUS PARTS OF THE MOTOR TRACT.

PROFESSORS HORSLEY and SCHÄFER, by varying the frequency of the number of interruptions in the primary circuit of Du Bois-Reymond's inductorium by means of a reed-vibrator capable of adjustment, stimulated at various rates the following parts of the motor tract: (1) Cortex cerebri, (2)

corona radiata, (3) pyramidal tract, (4) motor nerves. The motions were recorded by means of a tambour in connection with the belly of the muscle, the changes in the thickness of which were drawn on a smoked surface. The general result of their experiments may be summarized as follows:

1. The rhythm of muscular response to electrical excitation of the nerve centres (but not of motor nerves) is the same, viz.: ten per second for all rates of excitation above ten per second. Below that rate of excitation the rhythm of response corresponds with the number of stimulations per second.

2. The rhythm of muscular response in the case of voluntary and reflex contractions is essentially the same as that which results from direct excitation of the nerve-centres, viz., ten per second.

3. The rhythm of muscular response in all cases of after-excitation (whether epileptoid or not) is fundamentally the same as that of voluntary and reflex contractions, but in the case of epilepsy the response "may present a secondary rhythmic summation which produces a clonus of slower rate." "Every prolonged contraction of the skeletal muscles which is provoked by excitation, whether natural or not, of any part of the nerve centres, is a tetanic contraction which has been produced by a series of impulses generated in the nerve-centres, and passing along the motor nerves at an average rate of about ten per second."

4. Excitation of the motor nerves is followed by muscular response the rhythm of which is in all cases equal to the rate of excitation.

They think it clear, therefore, that the rapidly succeeding impulses arising from the quicker rates of excitation are not transmitted unaltered through the motor nerve cells, but become summated within them, and converted into a smaller number of impulses, which are forwarded with a constant slower rhythm by the peripheral motor nerve fibres to the muscles.

Voluntary Contraction of Muscle.

Messrs. Canny and Tunstall, under Prof. Schäfer's guidance, investigated the character of the continuous contraction of muscle in response to volitional impulses in man. They communicate the thickening of the muscles of the ball of the thumb by means of Marcy's tambours to a smoked cylinder. Although there is a greal of variation in the character of the tracings obtained from different individuals, and even tracings from the same individual at different times, and under different conditions, yet the rate of succession of the waves varies only within comparatively narrow limits. The extreme variations obtained in single seconds have been from eight to thirteen. The general conclusions arrived at are, (1) a prolonged voluntary contraction in man is an incomplete tetanus produced by from eight to thirteen successive nervous impulses per second. (2) The average rate of muscular response to volitional impulses is approximately the same in man as in other animals. (3) The average rate of muscular response to volitional impulses in man is approximately the same as the average rate of muscular response to rapidly recurring excitation of the nerve-centres in animals. (4) The average rate of muscular response to volitional stimuli in man is approximately the same as that obtained both in man and animals as the result of pathological or other excitation of the cortex cerebri producing epilepsy.

It would be a matter of no small importance to physiologists, if it could be thus easily settled by the graphic method, that the continuous contraction of

muscles produced by volition is excited by intermittent nerve-impulses in the same way as the artificial tetanus produced by interrupted electrical stimulation of a nerve; but in the face of the weighty evidence against this assumption, very clear graphic demonstration is needed to carry conviction. A number of tracings are delineated in illustration of these papers; however, they aid but little in arriving at positive conclusions, as their indefiniteness seems to indicate the possibility of extrinsic irregularities dwarfing the rhythm of the contractions, which seem deficient in the symmetry one would expect in such rhythmic phenomena. Some of the curves almost suggest a disturbance of the instrument from the tremor caused by the irregular contractions or relaxations of individual bundles of fibres by which this lateral method of examining a muscle is so easily influenced.—*Journal of Physiology*, April, 1886.

FORMATION OF GLYCOGEN.

Dr. F. Röhmann, of Breslau, made a series of experiments on rabbits, to test the effect of certain substances on the amount of glycogen produced by the liver. Taking two similar rabbits, he fed them for a certain time on a standard diet, to which, in the base of one was added the substance to be investigated, while the other was used for comparison (control-animal). As the result of four experiments he concludes that more glycogen is produced when asparagin is added to the diet. Glycocoll was also found, though not so obviously, to cause an increase in the formation of glycogen. From three experiments, he concludes that rabbits supplied with ammonium carbonate, together with carbohydrate diet, produce more glycogen than those fed on the same carbohydrates without any such nitrogenous substance.

By comparative experiments, using ammonium and sodium lactate, he is convinced that lactic acid, even in the presence of ammonia, does not belong to those substances out of which the organism can form glycogen.

Other experiments show that sodium carbonate does not act like the ammonia salt in increasing the amount of glycogen. He further concludes that the ammonium carbonate increases the amount of glycogen, independent of its acting as an alkali, and he thinks the above facts may throw some light on the theory of hepatic metabolism.—*Arch. f. d. Gesam. Physiol.*, May, 1886.

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF

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ASIMININE—A NEW ALKALOID.

We are indebted to Prof. Lloyd, of Cincinnati, for advance sheets of that part of the next issue of *The Drugs of North America*, containing the note by Dr. Bartholow on the new alkaloid recently discovered and named by Prof.

Lloyd—*Asiminine.*   This interesting principle is obtained from *Asimina triloba* —the so-called "Ohio papaw," but which, as Prof. Lloyd informs us, is a very different plant from the genuine papaw.

The preparation used in this course of experiments was a hydrochlorate of the alkaloid, the solution having the strength of $\frac{1}{60}$th grain to the minim.

Asiminine was ascertained to have two distinct stages of action : a stage of excitement followed by calm, sopor, passing into stupor and insensibility. The condition of excitement is accompanied by a high degree of muscular activity.   The muscular movements have a purposive direction like those of belladonna poisoning.   A frog, for example, in this stage of the action of asiminine, goes through movements of jumping and swimming, and as the effects deepen, the movements of swimming occur with a certain degree of regularity, but are not rhythmical precisely.   A slight touch at any point, but especially about the head, suffices to cause these movements until the narcotism reaches the extremest degree, but at last the movement is limited to the hind extremities and consists merely in separation of the toes and expanding the web.

Action on the motor nerves and muscles.   Asiminine was ascertained to leave the motor nerves and the muscles in the normal state.   When the sciatic was isolated, and the alkaloid prevented entering the limb, it was found that there was no difference in the action to stimulation of the nerve and the muscles.

Action on the sensory nerves.   The acuteness of the sense of touch was apparently heightened.   The faintest touch of the finest point until near the close of the action, caused prompt response, especially when the skin of the head was touched.   These responses consisted in closure of the eyelids, depression of the head, and then the general muscular movement as of swimming.   A stage of the action was after several hours reached, when very strong irritation caused no response, if so carefully done as to avoid awaking the sense of touch. If a toe were seized very dexterously without disturbing its position, it could be very strongly pinched without causing the least movement.   If the skin of back or thigh were seized very carefully with fine forceps and pinched, no response followed, but any roughness of contact caused an immediate movement.   It is found that if a saturated solution be applied to the mucous membrane of the mouth it causes numbness, and distinctly lessens the sense of pain.   It is doubtful, however, whether this action can be utilized, since the solubility of the alkaloid is not sufficient to effect the necessary thoroughness of contact with the sensory nerve endings.

Asiminine slows without weakening the heart's action.   Faradic stimulation of the accelerator apparatus increases the number of the pulsations.   The vagus is apparently unaffected, until near the end, but further experiments are needed to determine to what extent.

During the stage of excitement the respiratory movements are increased ; but as the condition of stupor deepens, they are correspondingly slowed.   The most important and characteristic action of asiminine is that on the cerebrum ; the stage of excitement with delirium in which movements of an apparently purposive nature occur; the stage of sopor and gradually deepening coma, with ultimate muscular resolution.   If the hypnotic and anodyne action prove to be true of the higher animals and man, asiminine will be a useful addition to our therapeutic resources.

The Treatment of Progressive Pernicious Anæmia.

M. Henrot, of Rheims, in a paper read at the Medical Congress of Nancy on the subject of progressive pernicious anæmia (*Revue de Thérapeutique*, Oct. 15, 1886), thus refers to the subject of treatment: Transfusion has proved unsuccessful. Very useful in the anæmia due to hemorrhage, it has not succeeded in this form of anæmia, and probably because the peculiar state of the blood is due to a microbe. Nevertheless, Quincke has had two successful cases. The most appropriate medication consists in the inhalation of oxygen, the subcutaneous injection of quinine in large doses, and in the use of arsenic. Balkins has effected sixteen cures by the arsenical treatment.

On Eulyptol and its Internal Administration.

Under the name *eulyptol* (not "eucalyptol") Schmeltz designates a remedy prepared from salicylic and carbolic acids, and essence of eucalyptus—six parts of the first named and one part each of the others. This preparation may perhaps be useful as a surgical antiseptic, but when administered internally in doses of from eight to ten grammes (ʒij to ʒiiss), it can only act as an antipyretic. With this view Schmeltz has prescribed it in rheumatism, in which malady the eulyptol, because of the salicylic acid constituent, lessens the pain and joint swelling. By its use typhoid evacuations are disinfected and modified in character. It has also proved useful in catarrhal affections of the respiratory organs. It is soluble in alcohol and ether, but less soluble in water. It does not cause so much stomach pain and flatulence as the salicylates.

The Curability of Arterial Cardiopathys.

In an elaborate memoir on the above named subject (*Bull. Gén. de Thérap.* for October 15, 1886), Dr. Huchard has passed in review the methods of treatment most effective. Digitalis is always the most important medicine in the asystolic condition, but in the presystolic period—the prealbuminuric stage of Mahomed, of interstitial nephritis—the best remedy is the iodide in from one to three grammes (fifteen to forty-five grains) daily, continued over one or two, even four years. Under the use of this the arterial disturbance lessens, even disappears, whether the lesion is sclerosis of the coronary artery, myocarditis, valvular disease, aortitis, etc. If any are incredulous, our author reminds them how a graver lesion—aortic aneurism—is certainly made to disappear under the iodide treatment, as Bouilland first proved, and the fact afterward confirmed by Potain, Paul, and Bucquoy, of France, and Craig, Chuckerbutty, Balfour, and Bramwell, of England. It was M. Germain Sée who conceived the idea of employing the iodides continuously for the relief of increasing cardiac hypertrophy. "Iodide of potassium," says Dr. Sée, "is a most valuable cardiac medicine, and is effective, not only in the dyspnœa or asthma, but it powerfully modifies the muscular lesions, notably myocarditis, whilst at the same time it increases the contractile energy of the vessels, facilitates respiration, and maintains in a permanent way the tonicity of the art."

Dr. Huchard holds that the iodide acts on the vessels in a similar manner,

and to this power is to be ascribed its curative effects in sclerosis of the arteries, aortitis, angina pectoris, etc. But one of the conditions of the success of this medicine is prolonged administration. It is necessary to give the iodide of sodium during two or three years at the least, in the dose of one to three grammes (fifteen to forty-five grains) daily. This medication, notwithstanding there are idiosyncrasies to be provided for, is perfectly well borne, and if the iodide be suspended during six or eight days of every month, can be taken as stated above without the occurrence of serious iodism.

Dr. Huchard prefers the iodide of sodium over the corresponding potash salt, because it is less toxic, the salts of potash endangering the production of *potassæmia* (uræmia), which, as Messss. Feltz and Ritter have demonstrated, is due to the retention in the blood of the potash, rather than of the other constituents of the urine.

On the Action of Caffeine as a Diuretic.

In an elaborate research into the mode of action of caffeine, Schröder (*Archiv für experimentelle Pathologie und Pharmacologie*, October, 1886, Band 22, S. 39) states the following conclusions:

Caffeine must be regarded as causing diuresis by a direct stimulation of the renal epithelium. Hitherto no remedy has been known that affects in so high a degree the urinary secretion. In caffeine we have a remedy whose action on the kidney may be compared to that of pilocarpine on the salivary and cutaneous secretions, in so far that both cause a powerful secretion from the glands, but in the mode of the action there are important differences. Pilocarpine stimulates the excito-secretory nerves, while caffeine acts directly on the renal epithelium. It is not possible, as yet, to localize the part of the tubules on which it acts.

Very various have been the views entertained by clinicians as to caffeine's mode of action. Some regard it as acting in a manner similar to digitalis, holding that, like the latter, it slows the pulse and raises the blood-pressure. This parallelism cannot be admitted, and Maki has proved that their influence on the heart is different. Both raise the blood-pressure, but the mode in which this is effected differs. Digitalis acts on the heart muscle, increasing its power, whilst caffeine raises the blood-pressure by stimulating the vasomotor centre. It cannot be too strongly stated, that for the production of a diuretic effect, only those remedies are useful that raise the blood-pressure by increasing the power of the heart. If the blood-pressure is increased merely by stimulating the vasomotor centre, the renal secretion is checked in an exactly opposed sense. The diuretic action does not influence the manner in which the blood-pressure is raised. The pulse becoming fuller under caffeine, and also the slowing of the beat often observed, have led to the opinion that this agent acts like digitalis. Some physicians, however, like Gubler and Brakenbridge, have not referred the diuretic to the supposed cardiac action, but to a direct effect on the kidney. In one of the most recent discussions on this subject by Bronner (*Dissertation*, Strassburg, 1886) the doctrine of the parallelism of caffeine and digitalis is strongly opposed. . That caffeine exerts a marked action on the heart's movements, even in cases of cardiac failure, cannot be affirmed. On the contrary, when the diuretic effect occurs, slowing of the pulse-rate is not observed. Nor did the diuresis take place in

the same way, as from digitalis. Thus, the pharmacological and clinical observations have alike demonstrated that the diuretic action of caffeine is entirely independent of any effect on the heart.

The stimulation of the vasomotor centre with the attendant excitement produced by caffeine, is the cause, not only of annoyance to the patient, but of interference with the diuretic action. The uncertainty of the diuretic action which is often complained of, is due to the varying excitation of the vasomotor centre in different persons. To eliminate this central excitation, one of two courses may be pursued : either to combine with caffeine an agent opposing its vasomotor action, or other members of the caffeine group that have the diuretic without the vasomotor effect, may be tried. Very good results have been obtained by the conjoint use of paraldehyde.

Sulphate of Sparteine.

DR. HANS VOIGHT publishes the results obtained from the use of the sulphate of sparteine, in Prof. Nothnagel's clinic (*Centralblatt für die gesammte Therapie*, October, 1886). These interesting observations were made in consequence of the very favorable results obtained from sparteine by Prof. Sée. It was first employed in 8 cases of valvular affections, and afterward in cases in which the heart's action was secondarily impaired (4 cases of emphysema, 2 of pleuritis, and 1 of catarrhal jaundice). The effect of sparteine, after several days' administration, was studied by means of Dudgeon's sphygmograph. The results were as follows:

In small doses sparteine increases the energy of the cardiac contractions, the pulse becomes stronger and higher, and the tension of the arterial system rises. The frequency of the respiration is at first somewhat increased, but after further use of the remedy is somewhat lessened. The diuretic action is quite decided, and in correspondence with the increased cardiac action. Not unfrequently a slight narcotic action is manifest in the form of quietude and disposition to sleep. Intoxication symptoms, such as dizziness, headache, palpitation, and nausea, seldom occur after the smaller efficient doses ($\frac{1}{15}$–$\frac{1}{4}$ gr.), and when manifest are unimportant, quickly passing off; but if continued despite these symptoms they afterward cease.

Sparteine, as compared with the caffeines, with adonis vernalis (*adonidine*) and with convallaria, is manifestly superior in respect to the precision of the doses, and relative safety of administration. It is indicated in the valvular affections, when compensation has not been effected and the pulse is small and weak ; in valvular insufficiency without any special compensatory disturbance, as a regulating and tranquillizing remedy ; in insufficiency of the heart muscle without valvular lesions; in pericarditis; as a diuretic, in which respect it is quite unsurpassed, and in conjunction with digitalis to promote the action of the latter drug.

We need hardly remind our readers that sparteine is one of the principal constituents of scoparius (broom).

Observations on the Preparations of Cannabis and Cannabinum Tannicum.

DR. BUCHWALD, in the *Bresl. äerztl. Zeitschr.*, No. 24, passes in review some of the newer medicaments obtained from *Cannabis indica*, and attempts to fix

their precise value as compared with the established hypnotic and anodyne remedies.

The following are amongst the substances contained in the hemp plant to which its intoxicating qualities are in part attributed: *Cannabin* or *Haschischin* of T. and H. Smith; *Oxycannabin*, by Martius; *Cannabin* or *Hydracannabin*, by Personne, and *Cannabinine*, by Siebold and Bradbury. None of these have been subjected to clinical investigation. But a new era began with the cannabis preparations when Merck's *Cannabin tannate* was produced and made the subject of a physiological investigation by Fronmüller, who recommended it as a substitute for morphine under some circumstances. At first, using small doses, he found that larger ones were necessary, and at length settled on 3 to 4 grains as the hypnotic quantity of the Cannabinum tannicum. The pharmacopœia commission had stated 1 gramme (15 grains) as the maximum single dose and 2 grammes per day. The doses used by Fronmüller, sufficed in most cases to cause quiet sleep without any unpleasant after-effects. It is the more valuable, also, in that it does not check the secretions nor constipate. Intoxicating effects were observed only after large doses—7½ grains— yet in some cases of great pain as much as 20 grains were given. Fronmüller's statements have not been generally accepted. Eickholt observed that sleep was produced by it only after the larger doses mentioned above were given. Pusinelli concluded after his research that it may be a useful remedy in purely nervous, habitual, and neurasthenic wakefulness, but that it is not a pain-relieving remedy, and must be given in doses of from 5 to 15 grains, not being a dangerous agent. Stupefaction is caused by it; also dizziness, hebetude of mind, and, in some instances, instead of a tranquillizing action, excitement, nervous unrest, and increased wakefulness follow.

As tannate of cannabin has become quite cheap, Buchwald has used it in numerous cases in public and private practice. His conclusion is that the objections made by the authorities above mentioned to it are in the main justified, and that it is decidedly inferior to morphine, chloral, and paraldehyde as a hypnotic. He finds the excitant action so constantly unpleasant that patients become averse to taking it.

ANTIFEBRIN: A NEW FEVER MEDICINE.

DRS. CALIN and HEPP publish the results of some observations made on antifebrin at the clinic of Professor Kussmaul, of Strasburg (*Centralblatt für die gesammte Therapie*, Oct. 1886). Antifebrin (or phenylacetamid) is a pure white, crystalline, odorless powder, slightly caustic to the tongue, almost insoluble in cold water, but easily soluble in warm water, and freely in alcohol, and fluids containing alcohol, as wine. It has neither acid nor basic properties, and withstands the action of most reagents. Notwithstanding its close relations to aniline chemically, antifebrin can be administered in relatively large doses without causing toxic effects. The temperature of healthy animals is not affected by it. The clinical researches were made on twenty-four fever patients. It was administered in single doses, ranging from four to fifteen grains, in wafers, or simply stirred up in water, or dissolved in wine. Until now, thirty grains in twenty-four hours have not been exceeded; but the size of individual doses must be determined by the character, the severity,

and the stage of the fever, and also the idiosyncrasies of the patient. Notwithstanding its insolubility, the effect of antifebrin is quite as rapidly produced, and is four times stronger than that of antipyrin. Up to this time it has not failed in its action. The impression made by it on pyrexia is better effected by larger doses at longer intervals than smaller doses at shorter intervals.

Urethan by Subcutaneous Injection.

Dr. Hans Rottenbiller communicates to the *Centralblatt für Nervenkrank.*, etc., No. 10, 1886, his experiences with the use of urethan subcutaneously. His observations were made on 14 patients, there being 240 administrations. Of these 14, 6 were imbecile, 1 senile dementia, 1 idiot, 1 chronic insanity, 1 epileptic, and 4 dementia paralytica. He began with seven and a half grains, but this had an effect on one only, a paralytic with wakefulness. In the other cases, with doses from seven and a half to fifteen grains, he obtained sleep for four hours, only the first few days; afterward, only one to two hours' sleep. From one dose of thirty to sixty grains, six to eight hours of tranquil sleep were procured in 8 patients. With 4 others (1 paralytic and 3 imbeciles), the same amount caused only two to four hours' sleep. In a case with intense maniacal excitement and lively hallucinations, urethan failed, and paraldehyde was resorted to with success. After receiving the injection of urethan, the patients fell asleep in fifteen to thirty minutes; some woke up in two or three hours, but remained quiet, and, perhaps, fell asleep again in a half-hour. There were no unpleasant after-symptoms, except vomiting in one case.

Rottenbiller concludes that urethan, in the large doses of two to four grammes (thirty to sixty grains), causes six to eight hours of quiet sleep, but larger quantities are not well borne. The principal excellence of the remedy is that it produces no untoward results. On one hand is the consideration that several hours' sleep can be obtained from large doses, and sometimes no more than two to four hours'; on the other hand, the high price of the drug, and this it was that induced Rottenbiller to use it subcutaneously.

Naphthalin in Affections of the Urinary Organs.

At the session in August, 1886, of the French Association, held at Nancy, M. de Pezzer made a report on the use of naphthalin in affections of the urinary passages, with fetid urine. The daily quantity administered was one gramme and a half (about twenty-three grains). The fetidity disappears in from three to five days, and the urine changes from muddy, alkaline, and purulent into a limpid liquid, neutral or acid in reaction, and free or nearly so, from pus. And this result is accomplished without disorder of the digestive organs, without increased diuresis, and, perhaps, with a favorable action on the kidneys and bladder in pyelonephritis and cystitis. It has thus proved superior to all other antiseptics used in these affections, and its administration by the stomach is preferable to local application.

M. Bouchard thinks he has obtained permanent disinfection of the urine, by the administration of naphthalin in doses which cause ill effects if given

too long. He expresses the belief, also, that naphthalin is decomposed into naphthil-sulphite of sodium, which is a strong disinfectant.

Treatment of the Pains of Locomotor Ataxia by Ether and Methyl Chloride Spray.

Dr. Raisin (*Thèse de Paris*, 1886; *Bull. Gén. de Thérap.*, Oct. 15, 1886) finds that the pains of locomotor ataxia are amenable to treatment by refrigeration. Spray of methyl·chloride and of ether notably relieves when the pain comes on. It should rather be directed against the seat of pain, than along the spine, although the latter may be complementary.

Ether spray is less disagreeable, more convenient, and has fewer disadvantages than methyl chloride spray. It may be added that, for relief of local pain, ethyl bromide spray has proved to be highly efficient, and has, in some respects, advantages over the ether spray. Dr. Raisin makes no allusion to this use of ethyl bromide.

MEDICINE.

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Recent Studies in Pneumonia.

Fränkel (*Zeitschrift für klin. Med.*, Bd. x. H. 5 u. 6, 401–462) gives an exhaustive account of his bacteriological investigations, dividing his subject as follows:

The Microbe of Sputum-septicæmia.

He not only tested the infectious nature of the sputum of patients suffering from pneumonia, as well as of those affected by other diseases, but also examined that from his own mouth. He found that some of these sputa were either totally harmless when inoculated, or produced forms of disease differing from the sputum-septicæmia described by Pasteur, Sternberg, and others. The author's own sputum, on the other hand, proved itself most active in producing septicæmia. His method of procedure consisted in thoroughly mixing not too small a quantity of sputum with five to ten cubic centimetres of a seven per cent. salt solution; one to two syringefuls were then injected into the animals. Rabbits appeared to be the most susceptible to the virus. In a few hours they exhibited a rise of temperature to 41° or 42° C.; indisposition to eat; somnolence; somewhat laborious respiration; usually some twitching, and in thirty-six to forty-eight hours they were dead. The spleen

was always found to be three to four times its normal size; there was some-times peritonitis, but the lungs and pleura were almost always normal.

Even before death, and still more abundantly after it, the characteristic cocci were to be found in the blood. These are oval in shape, mostly diplo-cocci, provided with a capsule, and cannot with certainty be distinguished from Friedländer's microbe. That they are, in reality, totally different he shows later in his paper.

The two halves of the diplococcus which are contiguous, are somewhat flattened and broader, while the distal extremities seem slightly pointed. They may be stained in the same way as the so-called coccus of Friedländer.

The blood containing these microbes was highly infectious, and inoculations with it also produced septicæmia. All animals, however, are not equally affected. The action upon guinea-pigs varies. Pigeons, chickens, and dogs do not take the disease; mice and rabbits die invariably.

The raising of pure cultures of these cocci is difficult. It can be accom-plished very well on agar-agar, or stiffened blood serum, at a temperature of 35°–37° C., but at the ordinary temperature of the room it does not succeed. Within twenty-four hours there is developed upon the surface of the medium a bright, transparent, grayish-white coating, resembling somewhat a drop of dew. Inoculations from the cultures produce the same disease as does the septicæmic blood.

As regards the diminution of the virulence of the septicæmia-coccus by cultivation at a more elevated temperature, after the manner of Pasteur, Fränkel found that one or two cultures in a fluid medium at 42° C. was suf-ficient to destroy entirely the pathogenic power of the microbes for the rabbit, to whose organism it is usually so poisonous.

Although he was able, in the autumn and winter of 1883, to produce septi-cæmia repeatedly by injection of his own sputum, a year later he found such injections totally without effect. This led him to study closely the sputum of very many patients with different diseases. As a result he found that there is none so adapted to produce septicæmia as that of pneumonic patients, not only at the beginning of the disease, but long after the crisis had passed.

THE MICROCOCCUS OF PNEUMONIA.

Fränkel has examined, during the last three years, the lungs of a large number of cases which had died of pneumonia, and has always found diplo--cocci apparently identical with the well-known lancet-shaped forms already described by Talamon and Salvioli. He has never met with them in any inflammatory process of the lungs except genuine croupous pneumonia. He has succeeded in obtaining cultures in but a few cases, but these were iden-tical in all but two instances. They presented an almost transparent, grayish-white coating upon the culture medium; would not develop at the tempera-ture of the room; and resembled, indeed, in every particular, the culture of the sputum-septicæmia coccus. Inoculations, too, behaved in a manner precisely similar to those of this coccus; viz., rabbits and mice died from septicæmia; dogs, chickens, and pigeons shared an immunity; guinea-pigs were sometimes affected. In the cultures from two cases, as remarked, he had a different result. Neither had any effect upon rabbits, and one of them exhibited a few

short rod-like bodies under the microscope, although the vast majority of the microbes possessed the diplococcus shape.

THE RELATION OF THE PNEUMONIA COCCUS TO THE MICROBE OF SPUTUM-SEPTICÆMIA.

As already stated, the micrococcus of sputum-septicæmia occurs most frequently in the sputum of pneumonic patients. This can be seen in the following enumeration : 20 rabbits received injections of pneumonic sputum, and of these 10—i. e., one-half—died of septicæmia ; 18 received injections of sputum either from healthy persons (5), or from patients not suffering from pneumonia (13), and 3—i. e., one-sixth—died of septicæmia. It seems, therefore, right to assume that the coccus of sputum-septicæmia occurs at least three times as often in the sputum of pneumonic patients as in that of other individuals.

From this fact, then; from the result of microscopic study of the expectoration and of the lung ; from the nature of the cultures and their pathogenic properties as regards various species of animals, Fränkel believes that he is justified in regarding the coccus of sputum-septicæmia as identical with the species which he finds in the lungs in pneumonia, and in the pus of cases of empyema secondary to it. And he is also of the opinion, since he has never found the coccus in the lungs of any but pneumonic cases, that this microbe is the cause of pneumonia. The fact that it often occurs in the sputum even of healthy individuals renders it probable, on the other hand, that a certain predisposition to the disease, or some other factor must exist, such, for example, as "catching cold."

Concerning the difference between the lancet-shaped diplococcus and that of Friedländer, the peculiarities of the former have been sufficiently described. The cultures of Friedländer's microbe exhibit a very energetic growth at the ordinary temperature of the room, and an indefinite number of generations may be propagated from it. It is *not* poisonous to rabbits. It will kill mice when carried into the lungs with the air. Under the microscope, too, the cultures are different. In those of Fränkel's coccus there are to be found oval diplococci exclusively; while in those of the microbe of Friedländer numerous short bacilli are also to be seen. These, indeed, attain so considerable a length, that Fränkel thinks the organism should no longer be named "coccus," but "pneumo-bacillus;" and the small coccus-shaped forms observed are in this case to be considered as the smallest of bacilli. He applies the term "pneumococcus" exclusively to the diplococcus which he describes in his paper.

In one respect the two microörganisms are alike ; namely, that they do not produce lobar fibrinous pneumonia, even when the virus is injected into the lungs. This is probably because the animals die too soon for it to develop.

In a second paper, published in the *Zeitschrift für klinische Medicin*, B. xi. H. 5 u. 6, Fränkel enters more fully into the characteristics of the pneumococcus, its causative relation to pneumonia, and its connection with cerebrospinal meningitis.

He mentions two cases of this latter affection attending pneumonia, in which the pneumococcus was the only microörganism found in the exudate from

the pia. Cultures were made of it, inoculation performed, and septicæmia produced. He does not mean to say, however, that secondary meningitis is always caused by the oval diplococcus. The kind of organism observed will often depend on the nature of the primary disease. Foà and Uffreduzzi also have found Fränkel's microbe in the brain in two cases of meningitis with pneumonia. Senger reports five cases of meningitis secondary to the pulmonary affection, and in all the encapsuled diplococcus was similar to the pneumococcus. Other kinds of cocci were, however, sometimes associated with them, and Fränkel insists that to determine which of the species present in the meningitic exudate is the cause of pneumonia, we must study only those cases in which but one variety can be discovered.

One of the most striking peculiarities of the pneumococcus is that it loses its virulence with comparatively great ease and rapidity. Hence, to cultivate it successfully, the method of preparation of the culture medium must be most exact. It seems to grow best upon the stiffened blood serum, and retains its virulence for months, even to the fifty-third generation. But on agar-agar the pathogenic character is much more rapidly destroyed, unless renewed by propagation through animals by inoculation. The determination of the exact time when the poisonous property is lost was especially interesting. It was found that this depended largely on the proper composition of the agar culture medium, and especially on its degree of alkalinity. With the greatest care Fränkel was able to keep up the virulence as long as twenty-four days without the interposition of an inoculation, but this was exceptional. Transplantation must be made every fourth or fifth day, or oftener.

The great disposition of the pneumococcus to lose its virulence in a short time is shared by the coccus of sputum-septicæmia, and is still another proof of their absolute identity.

Fränkel knows no other species of bacterium, cultures of which can be confounded with those of this microörganism. Their very slow growth, and their peculiar brightness and transparency are quite characteristic.

The report of the investigations of WEICHSELBAUM, to which Fränkel refers, was published some months ago in the *Wiener medicinische Blätter*, No. 25, 775, 1886. For two and a half years Weichselbaum has been studying the subject, not only of croupous pneumonia, but of other forms of acute inflammation of the lungs as well; such, for example, as splenization, lobular pneumonia, and the secondary forms. He has examined 127 cases, and made culture experiments in 87 of them, and describes four varieties of pneumonia-bacteria:

1. The *Diplococcus pneumoniæ*, which seems to be the same as the pneumococcus of Fränkel.

2. The *Streptococcus pneumoniæ*, which appears similar to the Streptococcus pyogenes and erysipelatis, but which is probably a distinct species.

3. The *Staphylococcus aureus* and *albus*.

4. The *Bacillus pneumoniæ*, which he claims is identical with the pneumococcus of Friedländer. This microbe must be classified among the bacilli.

The first species was found ninety-one times, and most commonly in cases of genuine croupous pneumonia; the second was seen in several cases of primary pneumonia, as well as in those instances in which the disease was

secondary to some other affection of which this microörganism was the cause; the third was only to be discovered in cases where it already existed elsewhere in the body; and the fourth was present in but nine instances, and only cultivated six times. These few varieties, especially the diplococcus, occurred in numbers proportionate to the freshness of the pneumonic process. While it was present but sparingly and without the capsule in the gray hepatized parts, and even in the red, it was to be found in large numbers on the boundary of the infiltration and especially in the œdematous portions. In several cases the same bacteria which occurred in the lung, were discovered in the intermuscular and submucous tissue of adjoining regions, such as the thorax, neck, and air-cells communicating with the nose, and in two cases of meningitis were found in the pia and the ventricles. Inoculation experiments were practised in different ways upon various species of animals, and with the following results: The first and second varieties usually caused death in the case of rabbits and mice, with bilateral pleuro-pneumonia, and with or without enlargement of the spleen. The fourth species acted as does the microbe of Friedländer, except that it did not prove innocuous to rabbits. Weichselbaum concludes that these different forms of bacteria may all be the cause of pneumonia, and that the poison therefore is not a unity. The agent in the greatest number of cases is the Diplococcus pneumoniæ. He also claims that our division of inflammations of the lungs into lobar and lobular, croupous and non-croupous, etc., may be correct anatomically, but is not so etiologically; and that many of the so-called secondary pneumonias also are in this light really equivalent to the genuine primary disease.

PIPPING (*Fortschritte der Medicin*, 1886, No. 10, 319) has also been studying the relation of the microbe of Friedländer to lobular pneumonia. He has examined 14 cases, and in 7 of them found diplococci which resemble Friedländer's coccus. In 3 out of these 7 the capsule became distinctly colored by the method of staining employed, and the pure cultures obtained possessed all the characteristics of the microbe in question, while the results of the inoculation-experiments upon animals also proved them identical. In the other 4 cases similar cocci were found, but without capsules which could be colored, and the culture experiments were negative. Pipping concludes that this microorganism is the cause of broncho-pneumonia, as well as of the simple croupous form.

In this connection several other publications are worthy of note. Among them, one of considerable interest is that of THORST (*Deutsche medicinische Wochenschrift*, 1886, No. 10, p. 161), on the occurrence of the pneumococci of Friedländer in the nose. Thorst confirms the discovery by Klamann of cocci with capsules in the nasal secretion of ozæna, having found them in twelve out of seventeen cases, and having in some instances obtained pure cultures of them. Greater skill in stainings attending a more extended experience, revealed them also in cases of chronic rhinitis from other causes, and even in acute coryza. The cultures of the ozæna-coccus and of the pneumococcus of Friedländer were in all respects identical, and when injected into the lungs of mice caused death under the same dyspnœic symptoms.

LANCEREAUX and BESANCON (*Archives Générales de Médecine*, Sept. 1886, 257–288) report a series of twenty-three cases of pneumonia occurring in the

Hôpital de la Pitié during 1886, which tend to confirm the view of this disease as a cyclic malady produced by a microörganism. It was observed most frequently in February and March, and in a considerable number of cases was preceded or accompanied by an attack of influenza. Its relation to this latter affection was by no means clear; for, although the course of the disease was in most instances very abnormal, it did not correspond exactly with the description given by writers of the "influenzal pneumonia" of 1837. Six cases originated within the hospital in the same one of three wards. All six occurred within a week of each other, in the month of March, and all died. A large number of pneumonic patients had been received from outside into this ward during the month of February. Had the disease been variola, no one would have hesitated to call this an example of contagion from without, and the authors firmly believe that this does constitute an instance of contagious pneumonia.

The ushering in of the disease by influenza was noticed in a similar grave epidemic in this hospital in 1861. The same is true of the great epidemic of 1837, and of many others.

The pneumonia of 1886 was distinguished from the normal form by other characters besides its marked contagiousness. Its invasion was often insidious, or preceded by influenza for several days. A frank chill was the exception. Pain in the side was very decided and persistent, and the dyspnœa often great. In most cases the expectoration was abundant, moderately viscid, not rusty, but rose-colored, as in acute congestion. The elevation of temperature was not in accord with the severity of the case, and was often very irregular, as was also the duration of the disease. Oval cocci were found in the sputum of all but two cases, and in the lungs of two of those patients who had died.

Lancereaux and Besançon also describe a case with the symptoms of pneumonia which developed at the same time and in the same room with several other cases, but which revealed at the autopsy a pleurisy with fibrino-purulent fluid containing capsule-cocci. The disease was probably produced by the same organic cause at work in the patients suffering from pneumonia.

One case reported revealed at the autopsy broncho-pneumonia, with vegetative endocarditis containing some pneumococci, instead of the staphylococcus.

In another instance there were found post-mortem ulcerative endocarditis and fibrino-purulent meningitis, in addition to pneumonia; and ovoid encapsuled cocci were discovered in the diseased portions of the heart, lungs, and brain. Another case was somewhat more complex. In a woman who had died of meningitis forty-seven days after the onset of pneumonia, they could find only streptococci in the brain. This, they think, is an example of the ingrafting of an infection of another nature upon that of pneumonia. The possibility of this occurrence is confirmed, they think, by the cases reported by Jaccoud.

The progress of this epidemic of pneumonia is interesting. Beginning in January, the number and severity of the cases increased until March, but with few deaths. Then came the height of the epidemic, and following this, grave fatal cases and severe complications until June, from which time it became less serious and frequent, and disappeared some weeks before autumn.

The occurrence of influenza dwelt upon by these authors is of great importance in connection with the publication of Thorst reported above.

JACCOUD's paper, just quoted, is briefly as follows (*La France Médicale*, 1886, i. 758): Following ordinary cases of pneumonia in previously healthy individuals, there is sometimes noticed a persistence of some of the local symptoms. Then, after an indefinite period, the situation of the patient becomes more serious, and he dies with undoubted symptoms of a systemic infection. At the autopsy we find foci of suppuration in that portion of the lung where resolution was not completed, and others in the viscera, or in various parts of the body. It seems certain that the suppuration in the lung was the point of departure for the general infection. The same microörganisms, too, are found in the lung, in the distant purulent foci, and in the blood. He reports two cases in which he has established this pathological evolution:

In the *first*, symptoms of infection began two days after the crisis, and somewhat later a collection of pus developed in the knee-joint. After death the right lung and the kidneys exhibited many small abscesses. In the right heart were filamentous vegetations, and in the left heart others of a sanious nature. In the pus from the lungs Jaccoud found the streptococcus and staphylococcus, besides the pneumococcus of Friedländer. The pyogenic microbes were discovered also in the purulent matter from the knee-joint; in the vegetations in the heart, and, in fact, in all the extra-pulmonary foci. Inoculation with the pus practised on animals caused their death, and the same microörganisms were found in the blood.

The *second case* was very similar. Resolution began, but was followed, a week later, by symptoms of general infection from a pneumonic focus which had not cleared up, and a larger deep abscess developed in the region of the left buttock. This was opened, the patient improved and left the hospital; but died suddenly some weeks later. Abscesses were found in the lung, heart, and kidneys, and streptococci and staphylococci were to be seen in the pus from these regions. No pneumococci could be discovered in the lung. Cultures and inoculations proved the cocci to be as stated.

Having a direct bearing upon the studies of Lancereaux and Besançon is a report by KEMPF (*Medical Herald*, Louisville, June 8, 1886, 71), which would seem to be an indubitable instance of the contagiousness of pneumonia. A serving man in a family had been sick with pneumonia for some time, and was in the third stage when first seen. Within four days four members of the family were attacked by the disease in a typical form. No other possible cause could be discovered, except that the house and premises were in a filthy condition.

Another contribution to the contagious nature of pneumonia is that of GRAHAM, read at the meeting of the Canada Medical Association, in Quebec, August, 1886. He related a number of cases which had come under his observation during the past year in which this disease appeared to be contagious. These cases were divided into four series—three in the first, two in the second, three in the third, and two in the fourth series. In some instances the evidences of contagion were very strong. The conclusions arrived at by the writer are as follows:

1. That lobar pneumonia is in almost, if not in all cases, an essential fever.
2. That it is a parasitic disease.

3. That it frequently occurs in the form of epidemics.

4. That it has occasionally appeared to be contagious.

5. That the disease, in an epidemic or contagious form, is nearly allied to erysipelas.

6. That the early and persistent administration of tincture of iron is the proper treatment for these cases.

All writers, however, are not agreed that pneumonia is an infectious disease. ALEX. SHAW (*St. Louis Courier of Medicine*, 1886, 16, 22) reports several cases seeming to show the causal relation of vasomotor disturbances and pneumonia.

Cases 1 *to* 3. Three children, in different families, were attacked by severe gastric disturbance from eating walnuts. The symptoms were nausea, vomiting, colicky pain, and tenderness of the abdomen. On the second day, in each case, there were fever, pain in the left side of the chest, and cough; and on the third day, the physical signs of the first stage of pneumonia, with some consolidation, became apparent.

Fourth case. A stonecutter partook of a very hearty midday meal, and soon after, while at work, a stone fell upon his foot. He went home, and in the middle of the afternoon suffered from nausea, and vomited what he had eaten in much the same condition as when ingested. Upon the following day he entered the hospital, and rapidly developed symptoms of pneumonia.

Fifth case. A boy ate excessively one evening of cake. That night he became severely ill with acute gastric irritation, and before twenty-four hours had elapsed pneumonia showed itself.

Sixth case. The same child had subsequently another attack of pneumonia after acute indigestion following over-eating.

Seventh case. A child, recovering from catarrhal pneumonia, ate a quantity of sweetmeats. Soon after symptoms of acute indigestion appeared, and in less than twenty-four hours a relapse of the pneumonia followed.

Eighth case. Another child, recovering from catarrhal pneumonia, exhibited symptoms of indigestion, and in a few hours there developed a severe relapse of the pneumonia.

Now just as the flush appearing upon one of the cheeks in pneumonia teaches us that the vasomotor centre is involved in that disease, so the very common flushing of the face in indigestion shows the influence of the abdominal disturbance on the same centre. The spasmodic cough of indigestion, too, occurring particularly in children, is another evidence of a reflex perturbation of the vasomotor centre in this disease.

It is well known that the division or the paralysis of a sympathetic nerve increases the congestion of the part supplied by it, but diminishes its vital resistance; also that the action of the vasomotor centre may be exalted or depressed by influences derived from various sentient surfaces, the effect being felt either in the whole vascular system, or in a particular vascular area. Shaw, therefore, believes that pneumonia is in many instances produced by a disturbance of the vasomotor centre due to disordered digestion.

The exposure to extreme cold probably produces pneumonia in an analogous manner, viz., by occasioning through vasomotor perturbation a neuroparalytic hyperæmia in a circumscribed area. The fact that, as a rule, but

one portion of the lung is involved (a whole lobe or lobes), would indicate that some nervous influence, rather than some microbe, is the cause of pneumonia. The redness and enlargement of the pneumogastic nerve, found by Eccheveria in cases of pneumonia, speak also against the view of the pathogenic nature of any microörganisms present.

The author thinks it much more likely that the area in the lung already inflamed simply affords a suitable nidus for the growth of the microbe.

SEIBERT (*Berliner klinische Wochenschrift*, 1886, No. 17, 269), associated with other physicians, has investigated the influence of atmospheric conditions upon the frequency of pneumonia. His conclusions, founded upon the study of 768 cases, are as follows:

1. The development of fibrinous pneumonia is favored by certain meteorological conditions to such an extent that the difference in the frequency of the disease in different months is explainable on this ground.

2. Low and decreasing temperature, great and increasing humidity, and strong winds, are individually capable of exercising this determining influence upon the disease.

3. If two of these factors exist together—e. g., a high degree of humidity with a low temperature, or a falling temperature combined with a strong wind—more cases of pneumonia develop than if only one be present.

4. If all three of the conditions named above exert their influence at the same time, the number of cases of pneumonia is exceedingly large.

5. The frequent occurrence of cases of pneumonia continues as long as this state of the weather prevails.

6. The same meteorological influence is observed in the development of catarrh of the mucous membrane of the respiratory tract.

7. Catarrh already existing predisposes to pneumonia.

ON HÆMOGLOBINÆMIA AND ITS INFLUENCE UPON THE CONSTITUTION OF THE BLOOD.

In the physiological and pathological investigations concerning the constituents of the blood during the last ten years, hæmoglobin has received particular attention, especially in reference to its relation to, and union with, the stroma of the corpuscles. It has been discovered that quite a number of substances are able to separate the hæmoglobin from the latter, and allow it to mingle with the blood-plasma.

Beside these toxic hæmoglobinurias thus produced, there is a paroxysmal form caused by the action of cold, violent muscular exertion, burns, syphilis, and infectious diseases, and occurring after transfusion.

But a too exclusive attention has been paid to the appearance of hæmoglobin in the urine, and not sufficient to the process which produces it. There may, indeed, be fatal hæmoglobinæmia without hæmoglobinuria.

After this introduction, SILBERMANN, in the *Zeitschrift für klinische Medicin*, Bd. xi. H. 5 and 6, 459–487, makes a thorough study of the subject, particularly from this point of view, gives an historical sketch of the investigations which have been conducted by others, details his own experiments, and terminates his article with the following conclusions:

1. Hæmoglobinæmia and hæmoglobinuria represent a process in which the white blood-corpuscles, as well as the red, are concerned.

2. The hæmoglobin which has been dissolved in the blood, destroys the white blood-cells, and thus occasions a decided increase in the amount of fibrin-ferment.

3. This increase of the ferment can also be produced when the hæmoglobin passing into the blood plasma produces the substance necessary to the formation of fibrin-ferment by abstracting it from the protoplasm of the white blood-cells, without actually destroying them.

4. If there are large quantities of the ferment developed as a result of the action of hæmoglobin in the blood, fatal thrombosis may occur, or an excessive stasis in the large abdominal veins leading to a fatal anæmia of the brain.

5. If the action of the hæmoglobin is not so intense, not so much fibrin-ferment is developed, and consequently the abdominal venous stasis is not so great, although it is still considerable.

6. The excretion of hæmoglobin through the kidneys is accomplished chiefly in the tubuli contorti.

7. If, however, damage has been done to the glomerular epithelium through the general disturbance of the circulation, hæmoglobin will also be excreted in the Malpighian tufts.

8. The hæmoglobin rings found in the glomeruli partly are formed there, partly are produced by the backing up into them of hæmoglobin out of the tubuli contorti.

9. The convulsions appearing in toxic hæmoglobinæmia are to be considered as anæmic, not as uræmic.

10. The fever attending both toxic and paroxysmal hæmoglobinuria is occasioned by the large amount of fibrin-ferment circulating in the blood.

Contributions to the Pathology and Treatment of Bright's Disease.

Semmola, of Naples, recently made a communication, under this title, to the Académie de Médecine (*L' Union Médicale*, Sept. 9, 1886, 418).

According to his researches, true Bright's disease consists in a chronic diseased condition characterized by the following peculiarities:

1. Its etiology; namely, the excessively slow action of damp cold upon the skin, continuing throughout months or years.

2. A progressive weakening of the functions of the skin, reaching, finally, even their complete abolition. This is due to an increasing ischæmia and atrophy of the sudoriparous glands, a progressive atrophy of the Malpighian layer, and a proliferation of the connective tissue of the dermis.

3. A chemico-molecular alteration of the albuminoids derived from alimentation. This alteration is characterized by a diffusibility which is pathological, in consequence of which they fail to be assimilated, and are necessarily eliminated through all the emunctories, especially the kidneys.

4. A progressive diminution in the combustion of the albuminoids, expressed by the consequent diminution in the formation of urea. There results from this a lessening of the amount of urea excreted in twenty-four hours, without there being an accumulation of this principle anywhere in the body. The

blood of patients who have not reached the stage of uræmic intoxication contains a percentage of urea less than in the normal condition.

5. A serous infiltration of the subcutaneous tissue, making its first appearance in the face, of an erratic but progressive character, although its advancement is exceedingly slow, and not in proportion to the hyperæmia.

6. A very characteristic cachexia, out of proportion to the loss of albumen, but which represents a gross defect in the assimilation. This is demonstrated by the totally negative results attained by the employment of the most restorative nitrogenous dietary, even when the disease is in its first stage.

7. A secondary and very slow development of an inflammatory process of both kidneys at the same time. This possesses the characteristic histological feature of diffuse nephritis, typified by the *large white kidney*.

The author's *résumé* of the treatment to be employed during the long period in which the disease is still curable is as follows:

1. An exclusively milk diet. Ordinary nitrogenous food, and especially that very rich in nitrogen, ought to be proscribed, no matter in what period of the disease. Milk acts as a typical food, and not as a diuretic, and its beneficial action on nephritic patients is remarkable. This milk treatment should be pursued for a long time, and the attempt to test the tolerance for meat or for the yellow of egg must be made with the greatest reserve.

2. Methodical and repeated dry frictions of the skin, massage, and often the use of the vapor bath. Cold water treatment is to be avoided. It is never well borne by the patient, even at the beginning of the disease, on account of the lack of proper cutaneous reaction. Violent muscular exercise is also injurious.

3. The patient should live in a temperate climate, dry, and of even temperature. In winter, especially in variable climates, he should not go out much into the open air. Muscular exercise must be taken in his own room, which should be constantly at a temperature of 65° to 68° F.

4. Iodide and chloride of sodium should be given in progressive doses until the extreme of tolerance is reached.

5. If albumen has not entirely disappeared from the urine after the lapse of two or three months, and especially if the anasarca has completely vanished, it is best to substitute for the sodium iodide either the phosphate of soda, or the hypophosphite of soda or of lime in small repeated doses, giving 45–60 grains in the twenty-four hours.

6. Systematic employment of inhalations of oxygen.

7. The abandonment of the use of astringents as substances either useless or injurious.

On Sclerosis and on Inflammatory Contraction of the Valves of the Heart.

Although diseases of the heart have received so much attention, yet their chapter in pathology is not yet complete. HAMPELN (*Zeitschrift für klinische Medicin*, Bd. xi. H. 5 and 6, 487–510) claims that there is an especial need of a sharp distinction between two very important and distinct cardiac affections. The one a valvular contraction, arising usually from rheumatic endocarditis; the other a sclerosis of the valves, identical in nature with general arteriosclerosis.

At the present time the exact anatomical differences in the diseased valves are not understood, and this fact renders the subject difficult of study. Other anatomical items, however, aid in the diagnosis. Among them is especially noteworthy the frequent combination of sclerosis of the aorta, with the apparently similar affection of the valves developing at the same time. Again, the fact that all of the aortic valves are affected in this disease, while the mitral usually remains unaffected, is a marked feature.

The condition of the heart muscle shows certain peculiarities, depending on whether an endocarditis or a sclerosis has led to the alteration of the valves. In the first case we find a simple compensatory hypertrophy of that ventricle which is behind the affected valves—e. g., in insufficiency of the aortic valves, the left ventricle; and in the same condition of the mitral valve, the right ventricle. The cause of this is mechanical; an increase of the work thrown upon the heart, which acts as a stimulant to its action.

In the second case there is often found besides the hypertrophy of the left ventricle, a similar condition upon the right side, which is not explainable from a mechanical standpoint. Sometimes a simple dilatation, or even an atrophy of the right ventricle is met with. The reason for the hypertrophy of both ventricles in sclerosis of the aortic valves is not known with certainty. It proves, at least, that something more than a simple mechanical stimulus is at work. Many other causes, not well understood, undoubtedly combine in sclerosis of the valves to produce this hypertrophy of the heart *in toto*.

Another ground for belief in the independence of valvular sclerosis is that it develops in advancing years, at a time when rheumatism rarely occurs; and that it affects almost invariably the aortic valves. Endocarditis, on the other hand, usually follows rheumatism, occurs at a much earlier period of life, and attacks chiefly the mitral valve. And acute recurring attacks of endocarditis appeared to the author to be situated only on the old rheumatic valvular lesion, but never on the sclerosed valves.

Etiologically, too, the two affections are distinct. Acute inflammatory rheumatism plays the chief *rôle* in the production of valvular endocarditis although its symptoms need not be at all pronounced, and may, indeed, be almost entirely absent. In a much smaller number of cases endocarditis follows other acute or subacute infectious diseases. Regarding the etiology of valvular sclerosis, there is nothing positive to be noted. No connection with any other infectious disease, especially with rheumatism, can be discovered. The abuse of spirituous drinks, or of tobacco, great bodily exertion, and troubles and worries of all kinds often precede it; and simultaneously with its appearance evidences of renal and hepatic cirrhosis, diabetes, and arthritis deformans are often noticed.

As regards the age of the patients observed by Hampeln, almost all those attacked by sclerosis of the valves were over fifty years old. He has, however, seen it in one case at the age of twenty.

The symptoms of the two diseases are also different. We need only consider those cases in which there is a lesion of the aortic valves, since the mitral valve so very rarely suffers from sclerosis. The following symptoms then are prominent, according to whether we have to do with an inflammatory contraction or with a sclerosis. In the first case there is almost always an insufficiency of the valves, with the usual auscultatory signs. In the second case

there is frequently a pure stenosis. The basal portion of the leaflets is rigid, while the margins, which are still soft, will prevent regurgitation. Upon auscultation of such a case, a loud systolic murmur is heard over the aortic cartilage and manubrium, and is sometimes loudest over the apex. It must not be forgotten that a systolic aortic murmur may be developed with normal valves, when there is a dilatation of the ascending portion of the arch of the aorta. Autopsies show, however, that sclerosis of the valves is by far the more common affection.

The different reaction of the two valvular diseases upon the heart has already been mentioned. The aorta and peripheral vessels are also differently affected. Following aortic insufficiency from rheumatic endocarditis there is a state of passive stretching, while in valvular sclerosis they exhibit atheromatous degeneration. Often, too, a true aneurism develops, while this is never the case after rheumatic valvular insufficiency.

The general symptoms differ markedly. The most prominent point is, that we have in lesions from endocarditis, evidences of a process which has run its course. The disease is ended, and only its results remain. The heart often adapts itself to the extra work thrown upon it, and there is nothing to show the casual observer that the patient has any trouble whatever. Even when the valvular lesion is a very serious one, there are still always present the signs of more or less *increased cardiac energy*, although this may not be sufficient to afford complete compensation. It is only at the very end that this cardiac strength is overcome. On the other hand, in aortic lesions resulting from sclerosis we find a disease still existing and continuously progressing, and in which there are always signs of *cardiac weakness*. Palpitation of the heart has existed from one to two years; then œdema of the lower extremities set in and rapidly extended. Some cases suffer from cardiac asthma, others from angina pectoris, others from Cheyne-Stokes respiration. Examination reveals general disturbance of the circulation and marked cachexia, which often resembles that of carcinoma. The heart is frequently enormously enlarged, systolic and diastolic murmurs are to be heard, and there is a sclerosis of the aorta and peripheral vessels. The disturbances of the circulation grow worse, and hydrops of the serous cavities appears. All treatment is without any but temporary benefit, and at last the patient succumbs to a death which is often most painful.

The writer does not mean to say that the symptoms, as described, are evident in every case. Often signs of serious sclerosis elsewhere—as in aneurism—come more prominently forward. Or there may be no threatening symptoms to be observed anywhere. Hampeln closes his article with a full report of 110 cases of valvular lesion, and arranges them according to the classification already described.

New Tests for Glucose.

Von Jaksch recommends (*Zeitschr. f. klin. Med.*, vol. xi. p. 20) the use of phenylhydracin (first proposed by Fischer) as a delicate test for glucose in urine, blood, and other fluids, by means of which quantities otherwise too small for detection may be shown to be present. His method of using it is as follows. To a test-tube about half full of water, twice the quantity of

phenylhydracin hydrochloride that will go on the point of a knife ("messer-spitzen") is to be added, and four times as much sodium acetate. The whole is then heated till the reagents dissolve, when an equal bulk of urine is added and the whole boiled *for twenty minutes* (this is important, as a short boiling leads to failure) in a water-bath, after which the tube is plunged into cold water to cool. In a former paper (*Mittheilungen des Wiener med. Doctoren-Coll.*, Bd. x.) Jaksch gives his method more exactly: 50 c.c. of urine are to be mixed with 2 grammes of phenylhydracin hydrochloride, and with 1½ grammes of sodium acetate, dissolved in 20 c. c. of water; the whole heated in a warm bath from ten to fifteen minutes. If glucose be present, there occurs, amid a good deal of amorphous material, a yellow crystalline deposit, consisting of phenylglucoazon. The characteristic crystals are needle-like, and often united to form sheaves. Their melting point is at 204° C.

In examining various urines, von Jaksch never obtained a reaction in normal cases. In fever, and especially in a case of ulcerative endocarditis, traces of sugar could be demonstrated, so after chloroform narcosis, also in three instances of carbon monoxide poisoning and two of asphyxia from the inhalation of other toxic gases. On the other hand, the reducing properties of urine passed after caustic potash and sulphuric acid poisoning, and after the ingestion of benzoic and salicylic acids, were shown not to depend on sugar, since no crystalline deposit occurred.

In testing blood for glucose, it is first boiled with sodium sulphate, to remove the albumins, then filtered, and to the hot filtrate phenylhydracin and sodium acetate are added, when, on cooling, needles of phenylglucoazon will form. In this way he found glucose present in pus, and in abdominal and pleural exudations.

Two new tests for sugars are given in the *Monatshefte für Chemie* (*Phila. Med. Times*, Aug. 7, 1886), which, from their delicacy, promise at once advantages and disadvantages. They are as follows:

1. To 0.5 to 2 c. c. of the suspected fluid add two drops of a 15 to 20 per cent. alcoholic solution of alpha-naphthol. On shaking the mixture, a slight turbidity, from precipitation of the naphthol, will occur. Next add sulphuric acid to equal or double the original bulk, and shake again. A deep violet color will result if saccharose, lactose, glucose, levulose, maltose, or any carbohydrate or glucoside capable of yielding glucose with sulphuric acid is present. On the other hand, no reaction occurs with inosite, mannite, and quercite, nor with any of the substances contained in urine which may influence the copper tests, such as uric acid, creatinin, indican, pyrocatechin, allantoin, etc. Besides the various sugars just mentioned, such substances as vanillin, anethol, and methyl salicylate (oil of gaultheria), give the violet reaction. On diluting the above mixture with water, a violet-blue precipitate is thrown down, which dissolves in alcohol and in ether with a yellow, and in potassium hydrate with a golden-yellow, color. It is said this test is delicate up to 0.00001 per cent. of sugar, while the limit of Fehling's solution is 0.0008 per cent.

2. The same as above, except that a 15 per cent. to 20 per cent. solution of thymol is used, instead of naphthol. A deep red color results. On diluting the mixture a flocculent precipitate is formed which gives a pale yellow

solution when dissolved in alcohol, ether, or potassium hydrate; a bright yellow with ammonium hydrate.

Normal urines give the above reactions even when diluted from one to three hundred fold, which would seem to confirm the opinion of Brücke and others that traces of sugar occur in all urines.

To distinguish between a diabetic and normal urine, the following means are recommended:

1. Dilute both specimens one hundred fold and test each. The darker will be diabetic.

2. Diabetic urine gives a reaction even after the dilution reaches four to six hundred times the original bulk.

In trying these tests I have found the phenylhydracin to give very satisfactory results, while the thymol (the naphthol was not tried) was not at all so, inasmuch as a normal urine gave a far deeper red color than two specimens of diabetic urine, one containing over two, and the other over eight per cent. of glucose. It is possible that the thymol, which was a sample of the commercial kind used for disinfectant purposes, may not have been pure.

On Acetone in Normal Urine.

This question, which has never been definitely settled to the satisfaction of all, has again been investigated with every precaution against posible error, by MOSCATELLI (*Archivio per le Scienze Mediche*, vol. x. p. 231). He used twenty-five litres of urine from healthy individuals. From each litre, separately distilled, he retained only the first few cubic centimetres that came over. These were all finally mixed and redistilled, the first four cubic centimetres going over being used for testing. In this no acetone was found, though tests were used sensitive up to one-half a milligramme of pure acetone. He hence concludes that acetone is not present in the urine of normal individuals (who have not taken alcohol).

Formic Acid in Diabetic Urine.

The red color which some diabetic urines give with Fe_2Cl_6—commonly known as the "ferric chloride reaction"—is generally considered to be due to the presence of aceto-acetic acid.

LE NOBEL (*Centralblatt f. d. med. Wissenschaft*, 1886, p. 641) shows that it may also occur from the presence of formic acid. In seven specimens of diabetic urine he found formic acid present three times.

Reactions of Urine after the Use of Naphthalene.

PENZOLDT (*Archiv f. exp. Path.*, etc., vol. xxi. p. 34) has discovered that if strong sulphuric acid be allowed to flow upon a small quantity of such urine a beautiful green color will result at the junction of the two fluids, which finally, as diffusion occurs, becomes a dirty gray or brownish-green.

SURGERY.

In Europe.

UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

SURGEON TO, AND LECTURER ON ANATOMY AT, THE LONDON HOSPITAL.

Recent Surgical Literature.

The following new volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* have been issued. The first runs from "Gro" to "Gua." The volume possesses no article of surgical interest, nearly the whole fasciculus being occupied by the monograph on pregnancy. In the volume that follows ("Gua." to "Gy") is a fair paper on gymnastics. The work is by M. Dally, and is somewhat ambitious. The history of gymnastics and the physiological effect of exercise are well described, but without the introduction of original matter. The paragraphs on "technique" deal with exercises without apparatus—posture exercises, walking, and running. The apparatus described is practically limited to the horizontal bar and the parallel bars. The part of the paper on curative gymnastics is very poor and far behind the times. It considers little but the methods of Zander. Of Ling and the excellent system of Swedish gymnastics we hear little. The author has missed the opportunity of bringing out an interesting and much needed work.

Nearly the whole of the volume "Haa" to "Han" is taken up with "Hanche," although it does not exhaust the subject. The anatomy of the hip-joint is founded solely upon the anatomy of the French school. Much space is wasted in still discussing the function of the round ligament. The chapters on the physiology of the hip are fair so far as they go. They conspicuously avoid mention of the work of English authors on the subject. The sections on congenital dislocations of the hip are very poor. Acquired dislocations are fully dealt with, and the matter is up to date. There is an excellent table of cases of late reduction of hip dislocations. The subject of hip disease (upon which so much good work has been done in France) is not commenced.

In the last of the new volumes, that running from "Ube" to "Uri," is a long paper on ulcers, by M. Rochard. The author lapses into the old and obsolete classification of ulcers. His arrangement is the following: Ulcers. 1. Simple; 2. Inflammatory; 3. Atonic; 4. Fungous; 5. Phagedænic; 6. Callous; 7. Varicose; 8. Syphilitic; 9. Malignant pustule; 10. Tubercular; 11. Cancerous; 12. Farcy; 13. Scorbutic; and, 14. Frostbite. The article is not up to the standard attained by the majority of the surgical papers in the encyclopædia. It adds nothing to our knowledge of the subject, and the pathology savors of the past.

The same volume contains an admirable article on uranoplasty, by Petit. The article "Urèthré" is among the best that have appeared. The anatomical sections are by M. Quènu. They contain much original matter, and the

author makes free use of comparative anatomy. The chapter on ruptures and wounds of the urethra by MM. Piqué and Quènu are perfect, and conclude with an excellent bibliography.

The chapter upon stricture, by MM. Desnos and Kermisson, is not equal throughout. On catheterism and catheters it is excellent, but it is evident that the authors believe only in French surgery. We find no mention of Otis, of Teevan, of Reginald Harrison. The only foreign urethrotome mentioned is Thompson's. The authors prefer internal urethrotomy to the use of Holt's dilator, and regard external urethrotomy as "une méthode d'exception." As an exposition of the views of French surgeons upon the treatment of stricture, the monograph is no doubt admirable.

The new volume of FOLLIN and DUPLAY's *Traité de Pathologie Externe* completes the sections on the male genitals. It deals with preputial calculus, inflammation and tumors of the penis, varices of the penis, lymphatic varix and ossification of the penis. All these subjects are well dealt with and well illustrated. The chapters on elephantiasis and on cancer of the penis are poor. The diseases of the female genitals are commenced in this fasciculus. The authors still adhere to "esthiomene" in their description of chronic ulcers of the vulva. They state that it is a disease of adults, that it is allied to lupus, and owns the same etiology. The description of the sore is not very clear. There can be little doubt that this "esthiomene," to which French writers so tenaciously cling, concerns merely a tubercular ulceration of the vulva, that differs in no way from tubercular ulceration elsewhere.

The chapters on affections of the vagina are good. The volume concludes with a scanty section on displacements and deformations of the uterus.

DR. J. HOCHENEGG's monograph (*Uber symmetrische gangrän und lokale Asphyxie*, Vienna, 1886) furnishes a very complete account of our present knowledge of Raynaud's disease, with some new cases. It is the most exhaustive monograph that has yet appeared on the subject, although it adds little to what is known of the pathology of the affection. One very valuable feature is an exhaustive list of the already extensive literature.

Die Lehre von den Knockenbrüchen, by P. BRUNS, is among the most recent additions to Billroth's and Luecke's great work, *Deutsche Chirurgie*. It professes to be a complete treatise upon fractures in general, and is, without doubt, the most elaborate monograph on the subject that has appeared in any language. Every subject is fully dealt with—fat embolism, thrombosis in fractures, the manifold complications in broken bones, the processes of healing, and the various forms of non-union or mal-union. The work is worthy of its distinguished author.

Leçons de clinique Chirurgicale (vol. iv.), by M. PÉAN, is an immense volume of 1252 pages. It covers the years 1879 and 1880, and deals with a multitude of subjects. The first part is composed of fourteen valuable clinical lectures. The most noticeable of these are the following: Cold or Tubercular Abscess of the Tongue; Angeioma of the Breast and Lymphangioma. These papers are admirably illustrated, and form important contributions to surgical

science. The second part consists of a vast collection of miscellaneous cases. Many of these—in fact, the majority—are of no special interest. Some are poorly reported, and the collection forms a cumbrous, undigested mass. The statistics of operations contain such trifles as opening small abscesses and removing fingers. It appears that between 1881 and 1884, M. Péan performed no less than 229 laparotomies for various affections. A greatly condensed and well-edited edition of the work would be acceptable.

The following recent papers may be noted:

"Lipoma of the Mesentery," by M. Péan (*Gaz. des Hôpit.*, 1886, No. 39). Patient a woman of thirty. Enormous tumor. A pure lipoma. Laparotomy and removal. Cure.

"Removal of Osteo-sarcoma of Ribs," by M. Humbert (*Revue de chir.*, 1886, No. 4). Woman of twenty-one. Parts of the eighth and ninth ribs removed. Pleura and peritoneum opened. Tumor adherent to diaphragm, which was wounded. Recovery. Subsequent death from recurrence.

"Perforating Ulcers of the Hand in a Case of Tabes Dorsalis," by Dr. Terrillon (*Bull. de la Soc. de Chirur. de Paris*, t. xi. p. 408). Man aged twenty-six. Syphilitic: usual ataxic symptoms. The ulcers on the hand resembled the perforating ulcers of the feet.

"The Surgical Treatment of Empyema," by Dr. Aufrecht (*Berliner klin. Wochenschrift*, 1886, No. 10), and by M. Potain (*Gaz. des Hôpit.*, 1886, No. 36).

"Primary Cancer of Cowper's Gland," by Pietrzikowski (*Prager Zeitschrift für Heilkunde, und Centralblatt für Chir.*, 1886, No. 35). Patient aged nineteen. Perineal tumor size of fist, of six weeks' growth. Removal. Bladder and prostate clear.

"Arterio-venous Aneurisms of the Common Carotid Artery and Internal Jugular Vein," by M. Pluyette (*Revue de chir.*, 1886, No. 4). A case is reported. The paper gives a full account of this rare condition based upon the analysis of sixteen reported cases.

"Tuberculosis of the Bladder," by M. Boursier (Paris, 1886). An elaborate and valuable paper, founded upon the examination of thirty-seven cases.

"Case of Supposed Fracture of Neck of Scapula," by Mr. Eales (*Lancet*, October 9, 1886).

"Case of Cervical Spina Bifida cured by Injection," by J. Ward Cousins (*British Medical Journal*, 1886, p. 874). Child, ten weeks old. Morton's solution used. Only one injection made. Cure in six weeks.

"Lumbar Spina Bifida cured by Extirpation of the Sac and Osteoplastic Closure of the Gap in the Spine," by Dr. Dollinger (*Wiener med. Presse*, 1886, No. 7). Child, ten years old. Lower limbs deformed. Some nerves in sac.

"Spina Bifida cured by Operation," by J. Barton (*Lancet*, 1886, vol. ii. p. 626). Child aged two weeks. Cyst in the lumbar spine excised.

"Perineal Hernia," by Dr. H. Folmer (*Academisch Proefschrift*, Amsterdam, 1886). A very complete treatise on the anatomy, symptoms, and treatment of this rupture, with a collection of no less than forty-five cases.

"Bone-drainage in the Treatment of the Early Stages of Hip Disease," by Sir William Stokes (Dublin, 1886).

"Case of Separation of the Upper Epiphysis of the Femur," by A. W. M.

Robson (*Lancet*, 1886, vol. ii. p. 343). Child aged five. Injury when two years of age. Woodcut of the deformity produced.

"Retraction of the Penis," by Thomas Raven (*Lancet*, 1886, vol. ii. p. 250). Patient aged twenty-seven. Spontaneous retraction of penis. Penis had almost disappeared. Glans just perceptible under the pubic arch. Cure.

"The Distribution of Pyæmic Abscesses," by Stephen Paget (*Lancet*, 1886, vol. ii. p. 202). Analysis of two hundred cases of pyæmia.

MIDDLE MENINGEAL HEMORRHAGE.

MR. W. H. A JACOBSON (*Guy's Hospital Reports*, vol. xliii.) has produced under this title the most important contribution to surgical literature that has appeared for some time. The article is a credit to English surgery and must become classical. It is difficult in any abstract to give a proper conception of this remarkable paper. It commences with an account of the anatomy of the middle meningeal artery and of the parts about it. Then follow "the conditions which are liable to be met with in the parts concerned in middle meningeal hemorrhage." In the majority of cases the skull is fractured, but the existence of a fracture is not necessary for the production of the hemorrhage. The separation of the dura mater is to a great extent primary, and is due to the blow. The extravasation is secondary to that detachment. A fracture, if present, may be very minute or incomplete. Out of the 70 cases dealt with by the author, a fracture was present in 62, and in no fewer than 38 of these the base as well as the vault was involved. The trunk of the artery is comparatively seldom injured, and the usual advice as to the site of trephining is misleading. From two to three ounces represent the quantity of blood usually lost. The author divides all cases of middle meningeal hemorrhage into these three groups:

A. *The most hopeful cases for trephining.* Violence comparatively slight. Laceration of the artery or its branches. Fracture of skull, if present, slight and localized to side of skull—*i. e.*, not implicating base. Compression, but little or no contusion or laceration of brain. 27 cases (out of the 70).

B. *Less hopeful cases.* Violence greater. Laceration of the artery or its branches. Fracture implicating base. Some injury to brain, but this only trivial. 20 cases.

C. *Cases probably hopeless from the first.* Violence very great. Laceration of the artery or its branches. Fracture very extensive, perhaps implicating several bones and sutures both in vault and base. Injury to brain very severe. 23 cases.

The cases are reported in detail with comments and criticisms. The collection will prove a most valuable addition to clinical surgery.

The sections on the symptoms of middle meningeal hemorrhage are the most interesting. The author arranges them in the following order of value : *a.* Interval of consciousness or lucidity. *b.* Condition of limbs as to hemiplegia, paraplegia, rigidity. *c.* State of pupils. *d.* State of pulse. *e.* Unconsciousness increasing and passing into coma. *f.* Character of the respiration. *g.* State of the scalp and cranial bones. It is impossible to give an abstract of the elaborate analysis of these symptoms. The following points, however, may be noted: In 63 cases the interval of lucidity is mentioned. In 32 it was

well marked. In 10 it was but little marked and might have been overlooked. In no less than 21 (one-third) it was absent.

The following abnormal conditions of the limbs may be met with. Hemiplegia may be well marked, or little marked, or be only temporary. It may be more marked in one limb than in the other. There may be paraplegia, or absence of any paralysis, or the limbs may be rigid and twitching.

The three most important conditions of the pupil are thus described:

1. If the pupils are natural as regards reacting to light, the compression of the brain is probably in a recoverable condition, if trephining is immediately performed. Furthermore, it is probably a case of compression only of the brain without laceration or other injury.

2. If the pupils are insensitive and often at the same time dilated, the compression is probably extreme, and while trephining is as urgently called for, it is less probable that in these cases the brain will recover itself after removal of the clot.

3. If one pupil is found widely dilated, the other being natural or contracted in size, and if the dilatation be present on the side of the face corresponding to the part of the head injured—in other words, opposite to the side paralyzed (if hemiplegia be present)—it is a sign of the greatest importance.

Under the head of diagnosis of middle meningeal hemorrhage, special notice is given to the following conditions with which it may be confused: 1. Contusion or laceration of brain, especially of the temporo-sphenoidal and frontal lobes, the ecchymosis and consequent softening extending inward to the corpus striatum. 2. Laceration of the lateral or superior longitudinal sinus and extravasation of blood between the bone and dura mater or into the arachnoid cavity. 3. Hemorrhage after injury into the arachnoid cavity. The paper concludes with short sections on prognosis and treatment.

Brain Surgery.

Mr. Victor Horsley (*British Medical Journal*, October 9, 1886) opened a discussion upon this subject at the Brighton meeting of the Association in a very able paper. The paper dealt with the removal of cerebral tumors. The following are among the chief points connected with the operation details. The head must be shaved and very carefully cleansed. The anæsthesia is commenced by a hypodermatic injection of one-quarter of a grain of morphine and is then maintained by chloroform.

The operation is performed and the wound dressed with strict Listerian precautions. The scalp is raised by a semilunar flap. The bone is removed by a couple of trephine holes made at the opposite extremities of the area to be removed. The section is completed by Hey's saw and the bone forceps. The dura mater should be so incised that its edges can be subsequently united by suture. The cerebral tumor is removed by incision. The paper includes an account of three patients from whom portions of cerebral matter were removed with success. These patients were exhibited at the meeting. Justice could not be done to this important subject in the limits of a short abstract.

Microörganisms and Acute Suppuration.

Dr. D. O. Krauzfeld (*Inaug. Diss.*, St. Petersburg, 1886) has contributed a substantial monograph upon this subject. The author's investigations in-

cluded not only a large number (77) of clinical observations of various acute inflammatory processes, but also a series of experiments upon animals. The following is the sum of his conclusions:

1. In the pus in cases of acute suppuration microörganisms can always be demonstrated both by cultivation and by the direct examination of the pus.

2. The microörganisms most commonly met with are Staphylococcus pyogenes (aureus, albus, and citreus) and Streptococcus pyogenes.

3. The presence and the development of microörganisms in the tissues must be regarded as the principal factor in the etiology of acute suppuration.

4. Traumatism and like " causes " play only a subordinate part in the etiology, and act only as predisposing elements.

5. In infection, the following are the most notable conditions: (a) The quantity of microörganisms introduced. (b) Their collection on one spot. (c) The condition of the infected tissues (e. g., after injury).

6. Staphylococcus and streptococcus are two entirely different microörganisms, both from a morphological and a biological standpoint.

7. They differ in their cultivation forms and in their relation to the tissues of the organism.

8. Staphylococcus pyogenes. In cultivation—a more rapid growth and a good development independent of access of air. In the tissues—a rapid development probably through the medium of the blood.

9. Streptococcus pyogenes. In cultivation—a slower growth and a more feeble development, that proceed better without free access of air. In the tissues—a slow development and a localization especially in the lymph channels.

10. In the great majority of acute local suppurations the microörganisms enter through external wounds.

11. In some cases a general infection of the organism occurs through suppurative microörganisms from a distant external lesion.

12. The phlegmon due to Staphylococcus pyogenes is especially localized at the seat of the injury.

13. The phlegmon due to Streptococcus pyogenes is localized at a distance from the seat of injury following the lymphatics. (The lymph glands have much influence in localizing the process.)

14. Both Staphylococcus pyogenes and Streptococcus pyogenes can lead to a general infection (pyæmia, septicæmia).

15. In the general infection from Staphylococcus pyogenes the collections are especially localized in the internal organs; in that from Streptococcus pyogenes in the joints and serous membranes.

16. During the period of the development of the skeleton if there be a general infection from Staphylococcus aureus there is a disposition for the collections to be localized in the organs of locomotion, notably in the bones.

17. The inoculation of animals (rabbits) with a pure cultivation of Staphylococcus pyogenes leads to acute suppuration with its consequences (pyæmia, septicæmia, spontaneous osteomyelitis) akin to like conditions in man.

18. The suppuration observed under antiseptic dressings must be considered generally to own the etiology of acute suppurations.

IODOFORM POISONING.

FREDERICK TREVES (*Practitioner*, Oct. 1886) contributes a paper on this subject, in which he divides the symptoms into the two following classes:

1. The evidences of poisoning develop very slowly and insidiously. There is malaise and probably some loss of strength, loss of appetite with occasional vomiting, and, above all, the patient is weighed down with a sense of depression. There is usually a moderate degree of fever and an unusually rapid pulse. The sleep is at first broken, and there may be some wandering at night. Headache is not uncommon. In time the patient becomes apathetic and disposed to sleep. He is melancholic; his memory is distorted and impaired; he is troubled by dread of death, or some impending danger, and takes no interest in his surroundings. He remains in a condition of drowsiness; he wastes; he possibly becomes dirty in his habits; his tongue becomes dry and brown; he makes no complaints, and sinks into a more or less complete state of hebetude. Some patients in this condition have lost power in their legs, and all control over their sphincters. Others have been able to be propped up in a chair, and to move about a little until within a short while of death. In the fatal cases the patient becomes weaker and weaker, and in time utterly vacuous. He ultimately dies comatose. If the iodoform be left off, recovery may ensue in time, even when the symptoms have persisted in a marked manner for some time. In this phase of poisoning the progress of the case may be extended over weeks and possibly over months.

2. The symptoms usually develop much more rapidly, and they may indeed appear with some degree of suddenness. There is, perhaps, in the first place some malaise, then complaint of headache, which is often intense, and of vertigo. The sleep is broken, or the patient is quite sleepless. There are excitement and wandering at night. The temperature is high without appreciable cause, and may run to 104°, 105°, or 106°. The pulse is remarkable in its rapidity, mounting often to 150 or 180. There is often albuminuria; the appetite is greatly impaired, and there may be vomiting. The excitement passes into delirium. The patient has hallucinations, sometimes hallucinations of grandeur, and his symptoms may approach those of acute mania. The patient wastes, and becoming more and more prostrated may sink into a comatose condition and die. In not a few examples the symptoms have developed suddenly, and have commenced by sudden fever, or sudden and intense headache, or sudden and unaccountable delirium. In some patients the symptoms have very closely resembled those of meningitis.

Of these two phases of iodoform poisoning, the former may be regarded as the more chronic, the latter as the more acute. The former has been met with more frequently in old or debilitated subjects, the latter in younger and more vigorous patients. It is not to be inferred that all cases of iodoform poisoning will conform precisely to one or other of these phases. The two conditions may blend. In mild cases the disturbance may be quite slight— a little fever, a quickened pulse, a headache, and a restless night, and the poisoning has ceased. Intense headache, with vomiting and great restlessness, may be the only phenomena in other instances. Certain of the symptoms mentioned in the above descriptions may be entirely absent.

The peculiar and very rare exanthem met with in iodoform poisoning is described.

Mr. Treves gives the following as the conditions favorable for iodoform poisoning: The susceptibility of individuals to iodoform varies remarkably. Poisoning would appear to be more apt to occur in old and in young patients than in those in middle life. Symptoms may appear after the first application, or, on the other hand, may not manifest themselves until the powder has been used for weeks. Absorption with poisoning does not appear to be likely to occur from recent wounds unless they are of large size, nor from wounds that are sloughing or suppurating profusely.

The circumstances that would appear most favorable to iodoform poisoning are these: (1) The wound is clean and granulating, and the powder is liberally applied; (2) The iodoform is introduced into an abscess cavity, or into a sinus, or fistula, or confined space; (3) The powder is applied under pressure, or is surrounded by a more or less impermeable dressing; (4) The drug comes in contact with a mucous surface, as is sometimes the case in dressing a colotomy wound.

ACTINOMYCOSIS IN MAN.

DR. PARTSCH (*Deutsche Zeitschrift für Chirurgie*, Bd. 23, S. 498) describes eight new cases of this remarkable disease. In four instances the disease appeared about the lower jaw and in the neck. In three cases it assumed the form of "abdominal actinomycosis." These examples do not present any new features, nor do they differ from the now familiar descriptions of this malady. The eighth case, however, is very remarkable. In this instance the fungus developed in the scar left after extirpation of the breast. The patient was a man of sixty. In June, 1884, there was removed from his left breast an ulcerating carcinoma. The wound sloughed and showed little disposition to heal. Some skin, taken from a young man in sound health, was transplanted upon the wound. It was practically healed by September. In two months' time, however, the scar broke down and an abscess discharged itself. In the pus from this the actinomyces were discovered. All involved parts were excised, and the progress of the disease apparently arrested. There is no clear evidence to show how the wound was infected.

ARSENIC IN THE TREATMENT OF MALIGNANT TUMORS.

DR. KÖBEL (*Uber die Arsenbehandlung maligner Tumoren*, Tübingen, 1886) deals afresh with this subject. The treatment was applied to all varieties of malignant disease. The arsenic was taken internally for months in increasing doses, and was also employed locally in the form of a subcutaneous injection. The drug was found to be quite useless in cancer and in round and spindle-celled sarcomata of lymphatic glands. This point had been long established. A cure followed the use of arsenic in one case of multiple and rapidly growing sarcoma, and in many cases of malignant lymphoma. The first-named case is remarkable. The patient was a man aged thirty-six. During a few months no less than four tumors appeared at various parts. One developed in the right axilla, another under the left clavicle, with the result that the bone underwent spontaneous fracture; a third appeared on the acromion, and a fourth about the spine of the seventh cervical vertebra.

Arsenic was administered by the mouth and subcutaneous injections were used. The axillary tumor and that under the clavicle suppurated, and with the evacuation of the abscess the growths disappeared. The other two shrunk away without suppuration. The treatment was kept up for two months, and at the end of this time a new swelling was observed over the back. This was excised and submitted to a microscopic examination. It proved to be a spindle-celled sarcoma. In time recurrence took place in the cicatrix. It was now treated with injections of arsenic. It suppurated and necrosed, and entirely disappeared. At the time of the writing of the paper three years had elapsed. The patient remains well, and there is no sign of a relapse.

In seven cases of malignant lymphoma the use of arsenic was attended with excellent results. The term "malignant lymphoma" would correspond to the more familiar "non-leucæmic lymphadenoma." Dr. Köbel has collected, in addition, 52 recorded cases of this affection in which arsenic was employed. Of these 59 cases the arsenic was administered by mouth and by injection in 30 instances. In 24 administered by mouth only, in 5 by injection only. In 17 cases a cure followed after the treatment had been kept up for from one to six months. In at least five of these patients some recurrence took place at the termination of several months. The growth, however, appears to have again yielded to arsenic. A diminution of the tumor was noted in 14 cases out of the 59. In the remaining 28 cases, the use of the drug was attended with no benefit. There is no doubt that the treatment to be of any avail should be kept up for months, and the arsenic be given in increasing doses. Dr. Köbel's experience is greatly in favor of supplementing the general use of arsenic by local injections.

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Cystic Tumors of the Neck.

The theory has been frequently urged that certain cervical cysts are developed from lymphatic glands. The direct evidence that supports this theory is, it must be confessed, somewhat scanty. Dr. Jaksch (*Prager Zeitschrift f. Heilk.; Centralblatt für Chirurgie*, July, 1886) furnishes an interesting case bearing on this subject.

The patient, a young woman of twenty-four, had suffered for some time from carious teeth. Two years before she came under observation, a swelling appeared on the neck over the left clavicle. It grew very gradually, and assumed a lobular outline. It was distinctly fluctuating, and proved to be translucent. It more or less disappeared on tapping. It was extirpated. The operation was simple, and the patient left the hospital in twenty-seven days. The macroscopic appearance of the extirpated swelling showed multiple cysts of varying dimensions.

Under the microscope a series of lacunæ were seen that were separated from one another by trabeculæ of connective tissue containing here and there spindle-shaped cells. It appeared to the author very probable that this cyst was developed from the lymph sinus of a gland, and that it had followed a blocking of the lymph stream with breaking down and consequent thinning of the supporting tissue of the gland.

Dr. Gluck (*Deutsche med. Wochenschrift*, 1886, No. 2), in a short paper on blood cysts of the neck, reports the following case: The blood cyst was noticed in the side of the neck of a girl only sixteen years of age. The author has

little doubt that it originated as a "branchial cleft cyst," and that this, in time, effected a communication with the internal jugular vein. Anyhow, it was evident that this vessel communicated with a large cystic cavity. The cyst wall was composed simply of connective tissue. The tumor was excised together with the portion of the vein that it involved. The wound was dressed with iodoform gauze, and the child made an excellent recovery.

Dr. Paul Blocq (*Gaz. méd. de Paris*, 1886, No. 12 et seq.) devotes a long paper to an account of cervical cysts. He describes a new variety of neck cyst. It is closely connected with the larynx. He terms it the crico-thyroid cyst, and gives three examples of it.

The Association of Tetanus with Frostbite.

Paul Wagner (*Deutsche Zeitschrift für Chirurgie*, Bd. xxiii. S. 542) has published an interesting paper on this subject. It has always been asserted that cold predisposes to tetanus. The observation dates back to the time of Hippocrates, and refers rather to climateric conditions. Lappey, in his account of the Austrian campaign of 1809, wrote: "The wounded who were most exposed to the cold, damp air of the chilly spring night, after having been subjected to the quite considerable heat of the day, were almost all attacked with tetanus." It has not, however, been recognized that tetanus is peculiarly frequent after frostbite, and under these circumstances Wagner's communication will cause some surprise. Between January, 1879, and March, 1886, 164 patients with frostbite were admitted into the surgical clinic at Leipzig. Of these, no less than five—a percentage of 3.4—died of tetanus. The percentage of tetanus observed among the entire series of cases during the period named was only 0.096.

Wagner's statistics further show that only fifteen cases of tetanus were met with in the seven and one-quarter years, so that in no less than one-third of the cases the cause of the disease was—or appears to have been—frostbite. In three of these cases the frostbite was only of the second degree. In the rest it was severe. This communication affords still further support to the view that tetanus depends not upon any spreading neuritis or neurosis, but upon some blood poisoning. Such poison may take the form of ptomaines developed in putrefying parts about a wound. In frostbite this condition would be amply provided for. Most surgeons must have been struck with the fact that in traumatic tetanus the wound is generally foul or sloughing, even though it may be small.

Wagner cites one case especially that bears upon the theory of blood poisoning as a cause of tetanus. In this patient hæmoglobinuria appeared during the last two days of life. The occurrence of this symptom in such recognized blood affections as scarlet fever, typhus, and malaria is well known.

The Direct Treatment of Caries of the Cervical Spine.

Dr. A. Podres (*Russkaja Medizina*, 1886, No. 19) reports the following case: The patient, a lad eleven years of age, had presented for about six months the following symptoms: There were general anæmia and great debility; some slight cyanosis of the face; superficial and irregular respirations with difficulty on swallowing. The upper extremities were a little

wasted and were the seat of some loss of power. The head was kept rigid and was turned forward and to the right. The muscles of the neck were kept contracted. The spinous processes of the sixth and seventh cervical vertebræ were slightly prominent, and pressure upon these points occasioned pain. Extension of the head relieved the patient's breathing and the pains that were felt in the upper limbs. The case was diagnosticated as one of tubercular spondylitis. Dr. Podres resolved to expose the diseased vertebræ. Accordingly, an incision two inches long was made along the posterior border of the left sterno-mastoid near the base of the posterior triangle. The wound was deepened until the cords of the brachial plexus were exposed, and by following these the vertebræ were reached. Before they were exposed an abscess of some size was opened. At the bottom of this the bodies of the sixth and seventh vertebræ could be felt, and it is demonstrated that they were the seat of a superficial caries. All the diseased tissues together with the carious bone were scraped away. The cavity that resulted was well cleaned out and dressed with iodoform. The head was kept at rest in the extended position.

Great and continued relief followed the operation, and at the end of six months the boy was almost well. A sinus, however, remained. To close this a second operation was performed. The carious bones were again gouged, and all unhealthy granulation tissue removed. The sinus soon healed, and the patient made an excellent recovery. The neck remained somewhat stiff, and the head was drawn to the left side.

In this operation the same method was applied to the cervical spine that Mr. Treves, in 1881, applied to the lumbar vertebræ. The procedure has the merit of being founded upon recognized surgical bases—the opening of abscesses at the seat of disease, the removal of ill-conditioned inflammatory deposits, and the provision of free and direct drainage.

Excision of the Coccyx.

Mr. Walter Whitehead (*Lancet*, 1886, vol. ii. p. 112) gives two examples of this operation. Both the patients were males. In one case the coccyx was necrosed; in the other instance it had been displaced by injury. Mr. Whitehead gives the following *résumé* of his experience of this operation:

"The treatment of coccygeal pain falls under three heads, viz.: 1. By means of rest and anodynes. 2. By complete or partial separation of the bone from its muscular connections. 3. By excision of the bone. As in other cases, our method of treatment must always be guided by the nature of the case. Thus, in those where the pain is due to hysteria or to reflected irritation, owing to uterine or ovarian disease, it would obviously be unsurgical to remove the coccyx. There are, however, a large number of other cases, in which surgical interference will probably be required, and which may be arranged under the following heads: old fractures and dislocations, in which the bone has become fixed in a faulty position, either that of flexion or of extension; congenital elongation of the coccyx; necroses, whether traumatic or otherwise; tumors connected with the coccyx; and finally, a large group of cases of obscure pathology, in some of which there appears to be periostitis of some or all of the segments, in others inflammation of the sacro-coccygeal joint."

The Pathology of Hæmatocele of the Tunica Vaginalis.

Dr. O. Riedel's monograph (*Dissertation*, Halle, 1886, S. 51) is founded upon the examination of 21 cases of hæmatocele, all of which were submitted to operation. In 18 of these erosion or partial removal of the tunica vaginalis was practised, while in the remaining 5 cases, on account of atrophy or disease of the testis, castration was performed.

The author comes to the conclusion that the great number of cases of hæmatocele concern a chronic inflammation, which, under repeated irritation, may become acute and recurrent. The theory of the inflammatory origin of hæmatocele is not new. It was first propounded by Gosselin, in 1851. The present paper affords, in all points, a support to Gosselin's theory. According to this view the effusion of blood is not the first step. The tunic is not normal to begin with, but is the seat of false membranes. In about one-third of the bodies of old men examined post-mortem, adhesions are found to exist between the parietal and visceral layers of the tunica. It is evident that inflammation of the tunica vaginalis is very much more common than is usually supposed. The inflammation leads to exudation of plastic matter. This is, of course, vascular. If the vascularization be excessive, blood may readily escape from the newly formed vessels. According to this view, the false membranes so often found in hæmatocele precede the effusion of blood, and are not the result of the hemorrhage, as is very generally assumed.

Suprapubic Lithotomy.

Sir Henry Thompson (*British Medical Journal*, October 2, 1886) opened a discussion upon this operation at the Brighton meeting of the British Medical Association. The great majority of stone cases are provided for by lithotrity, which has irretrievably superseded lateral lithotomy. For the removal of stones which are much above the average size lithotrity is not applicable, and in such cases the suprapubic operation is superior to the lateral on these grounds: 1. In the suprapubic operation there are no important structures lying in the line of the incision, or sufficiently near to be rendered liable to injury, either by the knife or the forceps. 2. The space for removing a large stone above the pubes is practically unlimited. 3. There is little or no danger from hemorrhage. 4. The incision is simpler, and the whole operation less difficult and dangerous. 5. During the after-treatment the urine leaves the suprapubic wound more directly, and therefore more safely than it does by the long and lacerated opening made in the lateral operation. 6. Antiseptic dressings can be employed in the former, which are not available in the latter. 7. In the suprapubic operation it is impossible to cut the rectum, to inflict injury on the sexual organs, or to make a urethro-rectal or perineal fistula.

There are two special risks said to attend the operation—one of opening the peritoneum—the other of extravasation of urine around the base of the bladder. The former is virtually non-existent. With regard to the latter the risk is exceedingly small, because it can only happen as the result of unnecessary and unwarrantable interference with the tissues outside the bladder. The author then proceeds to describe the *modus operandi* in detail. He gives eleven cases of suprapubic cystotomy with only one death.

Mr. Reginald Harrison (*Ibid.*, October 2, 1886) in the discussion that followed this paper was not disposed to endorse Sir Henry Thompson's conclusions. His own experience of lateral lithotomy showed that the reputed risks of that procedure had been over-rated. His mortality in lateral lithotomy was only one in twelve, although he applied that operation only to the quite exceptional cases in which lithotrity was contraindicated. The risk of hemorrhage in lateral lithotomy had been exaggerated. That operation was especially useful in cases of sacculated bladder and in cases complicated with enlarged prostate or cystitis.

The following papers bearing upon this subject may be noted: Two cases of suprapubic cystotomy, by Mr. Pye (*British Medical Journal*, October 2, 1886). One for a large encysted calculus (weighing one-quarter of a pound) in a man of forty-eight—the other for removal of a villous tumor in a man of forty-six: both recovered.

Suprapubic lithotomy, by Thomas Smith (*Lancet*, Aug. 7, 1886). Man aged forty-three. Phosphatic stone with large oxalate nucleus; circumference thirteen inches; weight twenty-four and one-half ounces: excellent recovery.

Suprapubic lithotomy, by Prof. Annandale (*British Medical Journal*, Oct. 9, 1886), who advises the following new method of performing suprapubic lithotomy in male children and adults: 1. The gradual and thorough dilatation of the bladder by the injection of some antiseptic fluid. 2. The introduction of a lithotrite and the seizing and fixing of the stone on its blades. 3. The depression of the handle of the lithotrite so as to press the stone against the abdominal wall immediately above the pubes, in the middle line. 4. Cutting down through the abdominal wall, in the middle line, upon the pubes and just above it, until the bladder is reached. 5. Depressing the handle of the lithotrite still more so as to stretch the wall of the bladder over the stone and make it prominent at the wound. 6. Incising the stretched bladder wall upon the stone to a sufficient extent in a direction downward, and then protruding through the opening of the stone and the blades of the lithotrite. 7. Removing the stone and in withdrawing the lithotrite catching one end of an India-rubber catheter in its blades, and bringing it out through the urethral orifice, the other end being left in the bladder. 8. Stretching the abdominal wound and introducing a drain at its lower end.

Suprapubic lithotomy, by Sir William MacCormac (*Lancet*, September 25, 1886). Boy aged seven. Small mulberry calculus; wound healed by first intention.

Suprapubic lithotomy, by Mr. Barwell (*Med.-Chir. Trans.*, 1886). Two cases. Female aged nine; stone weighing two ounces; recovery. Male aged sixty; protracted recovery.

Encysted vesical calculus of unusually large size, by Mr. Rivington (*Med.-Chir. Trans.*, 1886). Male aged sixty-one. Phosphatic stone weighing twenty-three ounces removed by suprapubic cystotomy; died three months after the operation. The paper concludes with a valuable list of the records of unusually large calculi.

Suprapubic lithotomy, by Mr. H. A. Jacobson (*Med.-Chir. Trans.*, 1886). Male aged nineteen; good recovery. The article concludes with some valuable critical remarks upon the operation in general.

Properitoneal Hernia.

Dr. Baron (*Wiener med. Presse*, 1886, No. 16) reports two examples of this rare form of rupture. The variety is usually described in English text-books as the interstitial or parietal hernia. In these cases a sort of second sac or offset from the original sac extends between the structures composing the abdominal walls. The first example concerns a small inguinal hernia that had been strangulated some days. Herniotomy was performed. On reducing —or attempting to reduce—the gut a like tumor was found above the inguinal canal. When the neck of the primary hernia was opened up a large pro- peritoneal cavity was discovered as large as two fists, in the mouth of which the bowel was incarcerated. A successful reduction was made. The second case was that of an old woman with a strangulated femoral hernia. Herni- otomy was performed. After the femoral ring had been enlarged the strangulated loop was reduced. It was now observed that lying deeply in the neighborhood of the hernial orifice was a large properitoneal cavity. This was entered through the femoral ring and it was evident that its aperture was on the abdominal side of that ring. See also case of properitoneal hernia in the femoral ring in a woman of fifty, by Dr. Tansini (*Central- blatt für Chirurgie*, 1886, No. 31).

The Radical Cure of Oblique Inguinal Hernia.

Mr. William Macewen's ingenious operation (*Annals of Surgery*, August, 1886) for the radical cure of inguinal hernia is based upon the following lines. The sac is carefully separated, not only from the entire inguinal canal, but also from the abdominal aspects of the circumference of the internal ring. It is completely reduced from the canal into the abdomen beyond the internal ring, then thrown into a series of folds, constituting a pad which is placed on the peritoneal surface opposite the internal ring. It there constitutes a boss or bulwark, with its convexity presenting backward toward the abdomen, while its base rests on the abdominal walls surrounding the circumference of the internal ring. The canal having been refreshed by the finger and the handle of the scalpel during removal of the sac therefrom, its walls are brought into direct contact.

The sac is well separated without being opened, and the peritoneum for some little distance around the internal ring is separated from the parietes. The sac is now transfixed with a thread in such a way that where the thread is drawn tight the loose bag is drawn into a series of tight folds. The pad so formed is reduced into the abdomen and lies over the internal ring. In this position it is secured by a suture that penetrates the anterior abdominal parietes. The closure of the canal is effected in the following manner. The finger is introduced into the canal, and lies between the inner and lower borders of the internal ring. A threaded hernia needle is then made to penetrate the conjoined tendon in two places. First, from without inward near the lower border of the tendon; second, from within outward as high as possible on the inner aspects of the canal. One single thread is withdrawn from the needle, and the latter, together with the other end of the thread, is then removed. Another hernia needle, threaded with that portion of the stitch which comes from the lower border of the tendon, is introduced from within outward

through Poupart's ligament and the aponeurotic structures of the three ab-
dominal muscles. The needle is freed from the thread and withdrawn. It
is now threaded with the upper end of the stitch, and passes through the
three muscles at the level of the upper puncture in the tendon. The two
threads are now drawn well together and tied, and so the canal is closed. The
author washes the wound with corrosive sublimate solution, and dresses it
with iodoform. The steps of the operation are illustrated by some excellent
figures. Mr. Macewen has performed the operation in 47 cases. In 14 of
these strangulation existed. Not one of the patients has died. The results,
so far as the hernia is concerned, are admirable. Seventeen patients have been
under observation for from one to five years. Of the 47 patients, only 4 wore
any truss after the operation. Mr. Macewen's important paper will be read
with the greatest interest. It is doubtful whether any operation for " radical
cure " so well deserves the name as the ingenious and well-considered pro-
ceeding thus briefly noticed.

Excision of a Sarcomatous Tumor of the Bowel.

Nicolaysen, of Christiania, records the following very interesting case
(*Norsk. Mag. for Lagevid,* 1886). The patient was a man of twenty-eight, who
was admitted into hospital with an abdominal tumor. The tumor was some-
what kidney-shaped, was to be felt below the umbilicus, was obliquely placed,
and appeared to be about twelve centimetres in length. It was a trifle
tuberculated, was elastic, dull on percussion, quite movable, and free from
tenderness. It was liable to shift its position.

The tumor was first noticed six months after admission, when it was the
size of a hen's egg. Before this time certain abdominal symptoms had ap-
peared which had persisted and were increasing in severity. The patient was
liable to attacks of colic, and to vomiting after meals. Borborygmi were
present. Laparotomy was performed on July 10, 1885. The incision, four-
teen centimetres long, was made in the linea alba. The hand was introduced
and the tumor drawn out. It was found to concern some seven or eight cen-
timetres of the small intestine, growing especially from the mesenterial border.
In the corresponding segment of the mesentery were some bluish-black glands
of the size of hazelnuts. A large Spencer Wells's clamp forceps was fixed to
the gut on either side of the tumor and about four to five centimetres from it.
The bowel on each side of the clamps was again occluded by a small elastic
band which was tied round it. The distance between the clamp and the band
was about five centimetres. It was in the gap that the resection cut was made.
The portion of gut between the clamps was therefore some eighteen centi-
metres in length, and this was the portion removed. A triangular piece of
the mesentery corresponding to the resected segment was also removed with
it. The edges of the divided mesentery were united by catgut sutures. The
two ends of the bowel were joined then by a series of silk sutures that included
only the serous membrane and the muscular coat. The right-hand portion of
the gut was then invaginated to the depth of two centimetres into the left-
hand portion, and the serous surfaces thus brought together were united by
Lembert's suture. Finally, the two elastic bands were removed. The gut
was returned into the abdomen and the parietal wound closed. The operation

lasted two and a quarter hours. The patient made an excellent recovery, and six months after the operation showed no relapse of this trouble. The tumor proved to be a myosarcoma or spindle-celled sarcoma.

LAPAROTOMY FOR INTESTINAL OBSTRUCTION AND PERITONITIS.

DR. OBALINSKI reports thirteen cases (*Wiener med. Presse*, 1886, Nos. 4–12), of which the following is a brief abstract:

1. Apparent reduction of a strangulated inguinal hernia; laparotomy on the fourth day; death from peritonitis one day after the operation.

2. Subacute intussusception of the descending colon into the sigmoid flexure. Distinct tumor and well-marked symptoms that had lasted three weeks. The distended transverse colon was opened in the operation and the gap closed by sutures. The invagination was not reduced. Death in five hours. The autopsy showed gangrene of the intussusceptum, rupture of the intussuscipiens, and general peritonitis.

3. Intestinal obstruction due apparently to local peritonitis following the ulcerations of typhoid fever. The patient, a man aged fifty-seven, had presented symptoms of local peritonitis for four days. The abdomen was opened, some peritonitis existed about the cæcum. The peritoneal cavity was washed out. Recovery. The nature of this case is very obscure.

4. Strangulation of the small intestine by a band. Laparotomy on the third day. A large loop of the lower ileum was snared. There was peritonitis, with considerable effusion. The gut was liberated and the abdominal cavity washed out. Motion on the fourth day. Recovery.

5. Intussusception. Mild symptoms for five weeks, ending in acute symptoms that had lasted three days. A tumor found on the left side. Laparotomy was performed on this side. The tumor was found to come from the right iliac fossa and to consist of an ileo-cæcal invagination. The reduction was effected with great difficulty, and the serous coat was ruptured in many places. Death from peritonitis on the fourth day.

6. Symptoms of intestinal obstruction following the rupture of the sac in an extrauterine gestation; laparotomy; death.

7. Ulceration of the vermiform appendix due to the impaction of an enterolith. Perforative peritonitis; laparotomy; death in three hours.

8. Cancerous stricture of the sigmoid flexure in a woman of eighty-nine. Symptoms of ileus for twelve days; laparotomy; colectomy; union of the divided bowel with catgut. In nine hours the patient passed a motion, became collapsed and died. The autopsy showed that the bowel had given way at the suture line.

9. Symptoms of strangulation that had lasted three days. An inguinal hernia that was apparently reducible. Laparotomy. A small piece of strangulated gut was found in the inguinal canal and reduced. Recovery.

10. Volvulus of the small intestine. Acute symptoms for three days. Laparotomy; recovery.

11. Perforated peritonitis. Laparotomy; rapid death.

12. Obstruction due to kinking of the bowel by a peritoneal false ligament. Subacute symptoms. Laparotomy; relief of the bowel; recovery.

13. Volvulus of the upper jejunum. Severe purulent peritonitis. Laparotomy; death in ten hours.

Dr. Wahl (*St. Petersburger med. Wochenschrift*, 1886, No. 19) gives the following four cases:

1. Volvulus of the sigmoid flexure. Symptoms had lasted eight days. Laparotomy; replacement of bowel; death in twelve hours. Gut found to be gangrenous. The volvulus was untwisted without difficulty.

2. Intussusception. The patient was fifty-two years of age. Acute symptoms of a typical character had lasted for twenty hours. A tumor was detected. Laparotomy. Ileo-colic invagination discovered and reduced without great difficulty. Death in twelve hours. The autopsy revealed general peritonitis and gangrene of the invaginated bowel.

3. Intestinal obstruction due to an omental band. The patient was a man aged twenty-five, who had been subjected to an operation for the radical cure of hernia. Some omentum was found in the sac and a portion became adherent to hernial orifice. Laparotomy; division of the band; recovery.

4. Symptoms of intestinal obstruction persisting after the reduction of a strangulated umbilical hernia of twelve days' standing. The patient was a woman of fifty-four. Abdomen was opened and enterostomy performed upon the damaged loop of gut. Patient recovered with a permanent fecal fistula. The following papers bearing upon this subject may also be mentioned: Flatau (*Deutsche med. Wochens.*, 1886, No. 6). Laparotomy in intestinal obstruction. Bumstead (*Annals of Surgery*, 1886, p. 136). Case of laparotomy for intestinal obstruction; death. E. Krönlein (*Archiv für klin. Chir.*, 1886, p. 30). "The operative treatment of suppurative peritonitis." A summary of the subject with three cases. E. Ward (*Lancet*, July, 1886). Abdominal section for displaced hernia. J. Duncan (*Lancet*, August, 1886). Laparotomy for rupture of the bladder. R. L. Knaggs (*Lancet*, October, 1886). The operative treatment of chronic obstruction of the small intestine.

IN AMERICA.

UNDER THE CHARGE OF

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LAPAROTOMY FOR GUNSHOT WOUNDS OF THE ABDOMEN.

In *The Medical News* of Nov. 6, 1886 (Proceedings of the New York Surgical Society), Dr. W. T. Bull gives a full report of his second successful case of laparotomy for gunshot wound of the abdomen, together with notes of a fatal case, and mention of another which had just taken place.

In the first fatal case the patient, a man of fifty-seven, was seen two hours after shooting himself in the abdomen with a thirty-two calibre pistol, and was already in a condition of profound collapse. Four hours later, no improvement having occurred, in spite of energetic treatment, saline infusion was resorted to, and marked improvement was noted three hours later. The same evening a correct diagnosis of internal hemorrhage, due to wound of the

liver, having been made, laparotomy was performed. The left lobe of the liver was found to be almost cut in two, and before the very free hemorrhage could be checked the patient died.

In the successful case (healthy sailor, twenty-five years of age, shot in abdomen at short range with 38-calibre pistol), laparotomy was performed about two and a half hours after the injury. The bullet had passed entirely through a coil of small intestine, with prolapse of the mucous membrane at the point of exit, but not at that of entrance. These openings, as well as a longitudinal wound of the sigmoid flexure, exposing the muscular layer, and possibly perforating, were closed by the Lembert suture, fine iron-dyed silk being employed. Free venous hemorrhage from a perforating wound of the mesocolon was controlled by a silk ligature passed with a curved needle, and this, as well as an extensive peritoneal abrasion, was rubbed with iodoform. One of the appendices epiploicæ, and about three inches of omentum being found lacerated, were removed. The incision was closed by continuous catgut suture of the peritoneum, with silk and silver wire sutures, including all the abdominal layers, and superficial catgut sutures. Iodoform and carbolized gauze dressings were applied, covered by a Lister's coil. The abdominal cavity was washed out with warm carbolic acid solution, one per cent. Although the line of incision suppurated, and a portion of intestine protruded for some days, no peritonitis occurred, and the patient made a good recovery.

At the same meeting, DR. ABBE reported a case of laparotomy for bullet wound of the intestine and bladder, which, however, ended fatally.

We have reported these cases at considerable length, on account of the very small number of successful cases on record. Dr. Bull had been able to find only three (we presume his own previous case, and those of Kocher and Hamilton), to which Dr. Lange added a fourth, recently published in pamphlet form by a German country practitioner. It may be necessary to accept with reserve the case by Griffiths, stated by Adams (*Northwestern Lancet*, August 15, 1885, p. 412) to have occurred during the late war, since it is reported from memory, and not by the operator himself. Still the details are given with precision, and the reporter appears to have been present at the operation. Even if we omit this, the old but unquestioned case of Baudens should, it seems to us, undoubtedly be included in the list.

These operations, moreover, are of special interest, since surgeons are by no means entirely agreed as to the propriety of exploratory laparotomy in all cases of gunshot wound of the abdomen, when no certain evidence of intestinal perforation exists. Dr. Bull seemed to evade an expression of opinion on this subject by stating, in answer to inquiry, that no absolute rule could be laid down; that each case must be judged on its own merits. But we get no hint as to the criteria by which the surgeon may be guided in each particular case. To be consistent, when visceral lesion is uncertain, the surgeon must either invariably pursue an expectant course, or invariably resort to laparotomy. Dr. Bull seemed unwilling, at least in the discussion, to commit himself to either course.

Some of the older and more conservative surgeons will be inclined to ask whether, in the absence of extravasation of intestinal contents, Dr. Bull's cases might not have recovered without operation, and whether there are any cases of recovery following laparotomy in which *fecal* extravasation into the

general peritoneal cavity had taken place *any length of time before the operation*. It must be admitted, however, that the evidence from statistics and experiment is overwhelmingly in favor of early interference in the great majority of gunshot wounds of the abdomen, and Dr. Bull must be heartily congratulated on the skill and courage which have enabled him to conduct a second of these almost desperate cases to a successful termination.

Antiseptic Surgery.

Dr. C. B. Penrose contributes a short article to *The Medical News*, of October 16, 1886, on "Antiseptic Surgery in the Pennsylvania Hospital." New York surgeons have long been accustomed to hear their visitors from Philadelphia, after watching the painful and elaborate precautions taken to avoid or overcome infection of a wound, declare that they obtained just as good results without such appliances, and that pyæmia and septicæmia were almost unknown in their hospitals. Even in the most recent editions of the text-books of surgery by Gross and Ashhurst the whole subjects of asepsis and antisepsis, which engross so much of the time and attention of surgeons in all other parts of the world, are dismissed with an almost ludicrous brevity.

While the comparative freedom from the more fatal forms of wound-infection in the Philadelphia hospitals is doubtless due in part to the skill of the surgeons, and in part to the scrupulous cleanliness for which their wards have long been noted, it has been easy to learn from current surgical literature that equal success was not attained in avoiding suppuration. Indeed, when we find one of their best surgeons, in a recent work on amputations, recommending that silk ligatures should be used, cut long and the ends brought out at one angle of the stump, it is evident that the writer considered some suppuration inevitable, and, indeed, normal.

We were not prepared, however, for so bad a condition of affairs as is indicated by Dr. Penrose's statement that during four months, in his own ward alone, over a dozen cases of cellulitis of the hand and arm following wounds occurred. With the application of strict antisepsis to a limited number of cases, very much better results were at once obtained, while the remaining cases, treated in the old way (some antiseptic appliances, but no antisepsis), ran the same course as before. A list of seventeen major operations conducted aseptically, during three months, shows very satisfactory results. If a similar condition of affairs exists in any other Philadelphia hospital it is to be hoped that a similar experiment will be promptly tried.

Intubation of the Larynx.

Although this subject has already been discussed in the Journal, we refer to it again, on account of its great interest both to the general practitioner and to the surgeon. Dr. Northrup publishes (*Med. Record*, Oct. 30, 1886) a *résumé* of twelve cases (nine of which had been previously published) in which intubation was practised. The series is of special value as a contribution to the literature of the subject, as in all the cases the diagnosis was confirmed, and the necessity of immediate interference, to relieve the laryngeal obstruction, was recognized by two or more physicians. In all cases the dyspnœa was immediately relieved by the introduction of the tube, and in all but four

the relief was permanent. In these four, death occurred by extension of the membrane to the finer bronchi. Five of the twelve cases recovered.

The introduction of the tube seems to demand about as much dexterity and promptness as would ordinarily be needed for the insertion of the tracheotomy tube in that operation; and the presence of the instrument, in one case, for six days, does not seem to have had any injurious effect. So far, then, we are encouraged to a more extensive trial of this comparatively simple method.

PROF. MONTI, of the Vienna Policlinic, has been in the habit, for many years, of showing a number of hard-rubber tubes, which he introduces for the same purpose. He seems, however, to have considered them usually as merely a temporary expedient, to be used when tracheotomy could not be performed immediately. Still he has left them in place for twenty-four hours or more. Here the end of the tube protrudes from the mouth, an arrangement obviously less secure and more likely to excite irritation than that introduced by Dr. O'Dwyer.

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LAPAROTOMY FOR PERITYPHLITIC ABSCESS.

DR. HOMANS reports a successful case of laparotomy for perityphlitic abscess (*Boston Med. and Surg. Journal*, April 29, 1886). The patient, a boy of eleven, was first seen after suffering from pain and tenderness in the right iliac region for four days, and the operation was performed the next day. The incision was made over the most tender point, the peritoneum opened, and coils of healthy intestine which presented were pushed aside. An abscess, shut in by recent intestinal adhesions, was opened by breaking these up with the finger, and about two ounces of offensive pus evacuated. The cavity was drained, and the patient recovered.

As these abscesses, though usually intraperitoneal, can almost invariably be opened at a point where adhesions to the abdominal wall have occurred, or, if the operation be undertaken too early for this, by passing behind the cæcum, without opening the general peritoneum, laparotomy would seem to introduce an unnecessary element of danger, especially as the abscesses frequently contain fecal masses. Laparotomy would seem to present advantages only if it were intended in every case to attempt resection of the vermiform appendix in order to guard against the not infrequent recurrences.

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THE COMPARATIVE FREQUENCY OF ORGANIC STRICTURE IN THE WHITE AND COLORED RACES.

DRS. W. P. McINTOSH and H. R. CARTER furnish extensive statistics (*New York Medical Journal*, Nov. 13, 1886) from the record of the U. S. Marine Hospital Service, tending to show that gonorrhœal strictures of the urethra occur much less frequently in negroes, in proportion to the number of cases of gonorrhœa, than in white men. They conclude that about one urethral stricture occurs to twenty-three gonorrhœas in the negro, and one to eight in the white. Gonorrhœa seems, moreover, to be more frequent among negroes than among white persons, but to run a milder course.

There is a general impression that the genital organs of the negro are proportionally larger than those of the white man, though they are not aware that any exact observations have been made on the subject. A series of careful

measurements would, however, be of value to determine whether the average urethral calibre is larger in the negro. Were it so, we might find here at least a partial explanation of the different courses which the disease seems to run in the two races.

SUBIODIDE OF BISMUTH AS A DRESSING.

In *The Medical News*, of October 9, 1886, DR. A. S. REYNOLDS makes extraordinary claims for subiodide of bismuth as a perfect dry dressing, especially in chronic ulcerative processes. We are always somewhat suspicious of very enthusiastic reports in regard to new remedies, and Dr. Reynolds's hypothesis as to the mode of action of the drug seems fanciful. Yet if it accomplishes one-quarter of what is claimed, it should take a high rank as a surgical dressing.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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ANÆSTHESIA OF THE RETINA.

M. H. PARINAND, in *Annales d'Oculistique* for July and August, 1886, contributes an interesting paper upon retinal anæsthesia. He would limit the term to that particular type of amblyopia without special lesion or ophthalmoscopic sign, primarily characterized by a lessened sensibility to the stimulus of light, whether chromatic or achromatic, and proceeding generally from the periphery of the retina to the centre. A strange diagnostic symptom of this condition is incidentally noted: the fact that photophobia almost always accompanies it. The author allies this with the cutaneous phenomenon of painful anæsthesia, and calls attention to the common error of considering this consensus of clinical signs as indicating a hyperæsthesia.

More narrowly specializing the features of this anæsthesia, the author sets forth the following points: 1. The concentric contraction of the visual field for compound or white light, which condition may persist for years, and to such a degree that the total field may be comprised within five degrees, or the amblyopia may invade the macula and result in complete amaurosis. 2. Dyschromatopsia, or contraction of the field for colors, is constant. Generally, the order of disappearance is, first, violet, then green, blue, and red, consecutively. The persistence of red is noted, because in tabetic and alcoholic dyschromatopsia this color is the first to give way. The transposition of the circles of red and blue is also remarked, the blue field, normally more extended, becoming smaller than that of the red. More notable still is the remark that it sometimes happens that certain colors are perceived as such, or as grays, with a less luminous intensity than is required to bring achromatic stimuli to

the threshold of perception. 3. Visual acuity, or perception of form, is diversely implicated and difficult to make out, since this is largely dependent on refractive errors; but it is affirmed that a normal acuity often coexists with a pronounced amblyopia, and a visual field narrowed to forty or thirty degrees, and even with a reduced central luminous perception. This contrasts sharply with the amblyopia of optic atrophy where a normality of luminous perception often coexists with a considerable reduction of visual acuity. 4. Monocular diplopia or polyopia often accompanies this form of retinal anæsthesia, though wholly due to disorders of the refractive media.

The inception of this malady is not remarked by the patient, and its continuance and progress may likewise be unnoticed. It may also be said that in the usual examination of patients by ophthalmological surgeons, it would never be suspected by patient or physician, since, with direct or central vision, achromatic stimuli of full intensity are almost the only method and means of the ordinary test. Everything, indeed, seems to indicate that the customary ocular examinations are crude and insufficient. Wearying and tiresome as these may be to the ophthalmic surgeon, it is plain, for example, that the diagnosis of the affection under discussion could not be made at all without a measurement by photoptometers of the sensibility of the retina to different intensities of stimuli, both chromatic and achromatic, and in all parts of the field.

But to return to our author. The persistence of the disorder is remarkable when the fact that it is a functional trouble is considered, but the greatest distinction consists in the etiology. In contradistinction to such diseases as consist in pathological conditions of the end-organs, the rods, cones, and visual-purple of the retina, of which hemeralopia is the typical example, this form of retinal amblyopia always springs from the nervous centres, and is usually a concomitant of hemianæsthesia, and particularly of the hysterical type of hemianæsthesia. The author, however, would guard against the entire confounding of the two types, contending that the term hysterical amblyopia is not conterminous with anæsthesia of the retina. The cutaneous anæsthesia is sometimes limited to the parts surrounding the affected eye,[1] and, whether limited or general, may be the result of a local or general trauma. In this connection "the railway-spine of American physicians" is considered a symptom of a general neurosis, and not as a spinal type of the same.

The value of the recognition of this affection (general retinal anæsthesia) consists, besides its import to the physiologist and to abstract science, in the indications it gives of more primary and central disorder, itself being purely symptomatic and secondary. The fundamental hemianæsthesia may be either hysterical in origin, or due to toxic or other lesions at the cerebral centres. An interesting side-light is here thrown on the relations of the cerebral hemispheres. In 400 or 500 cases of hemianæsthesia examined by the author no case of hemiopia occurred, thus proving the justice of Charcot's remark that the coexistence of general amblyopia and hemianæsthesia argues a connection of each retina *in its totality* with the opposite cerebral hemisphere. This, as is well known, is opposed to the view of von Gräfe. In reply to the objection that the amblyopia is often binocular whilst the hemianæsthesia is uni-

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[1] See Fox and Johnstone on temporal reflex, Medical News, March 8, 1884.

lateral, the author thinks this arises from a failure to recognize a lessened and subnormal sensibility of the supposably normal side. The color-student will find in the article many interesting facts. For example, the following the disputed question of the binocular fusion of two complementary colors, the author adduces this astonishing fact that when one of these colors was thrown upon the retina affected with chromatic anæsthesia to this color, the fusion nevertheless took place in many cases, precisely as if both eyes had been normal—that is to say, an eye insensitive to green with normal perception of red, behaved under the excitation of green synchronously with that of red to the other (and normal) eye, so far as the resultant unity of chromatic sensation was concerned, just the same as a normal or green-perceiving eye would behave. In the same way an eye anæsthetic to one of the complementary colors covering two-thirds of a Maxwell disk, nevertheless recognized the resultant white when the disk was rotated. The complexity of retinal and cerebral interconnections is thus emphasized.

HEMIANOPSIA.

In the *Journal of Nervous and Mental Disease* (New York) for January, 1886, DR. E. C. SEGUIN gives a succinct tabulation, with a masterly *résumé* of the lessons to be gathered from the same; of the 46 reported cases of hemianopsia, the cases are grouped as follows: 4 were indefinite or useless for the study of localization; 3 produced by pressure upon optic tracts or chiasm; 6 due to lesion of the corpus geniculatum laterale, or the thalamus opticus, or both; 12 caused by lesion of the white substance of the occipital lobe; 5 traumatic lesions of the occipital region of the skull; 16 lesions of the cortex, or of the cortex and subjacent white substance.

The objects sought from the study are, of course, two-fold: 1. The diagnostic value of hemianopsia alone or joined with other symptoms such as cutaneous anæsthesia, hemiplegia, etc., as pointing out the position and nature of the cerebral lesion. 2. The location of the psychic centre for vision. Concerning the latter point the views of Munk and Ferrier are alone considered as authoritative; according to Munk, this centre, as is well known, is held to be in the occipital lobes, each visual area having connections with both retinæ. Ferrier held it to be in the angular gyrus. The conclusive cases of the table show Munk's view to be the more trustworthy, and the author finds reason to harmonize the more general position of the two investigators by calling attention to the route of the optic fasciculus of Gratiolet and Wernicke, which, as it passes close under the inferior parietal lobe of the angular gyrus on its way to the occipital lobe, is extremely liable to be severed or interfered with by any injury to the angular gyrus, whence may have arisen Ferrier's error. Charcot's view of a second decussation of the lateral fasciculi through the corpora quadrigemina is discarded as wholly inconsistent with the clinical facts, and it is intimated that Charcot himself has abandoned it, so that the famous diagram, except as history, may now disappear from the text-books. An illustration of the course of the optic tracts without secondary decussation beyond the chiasma is shown, with the ultimate psychic centre for vision located in the cunei and subjacent gyri of the occipital lobes. The following diagnostic laws are tentatively offered by the author as a result and summary of the teachings of the whole discussion:

1. Lateral hemianopsia always indicates an intracranial lesion on the opposite side from the dark fields.

2. Lateral hemianopsia with pupillary immobility, optic neuritis, or atrophy, especially if joined with symptoms of basal disease, is due to lesion of one optic tract, or of primary optic centres on one side. This diagnosis may be further strengthened and rendered quite certain by seeking for and finding one-sided pupillary reaction, as recently suggested by Wernicke. He ingeniously predicts that one lateral half of each iris will be found to contract by the reflex effect of light when one optic tract has been interrupted. He designates this as "hemioptic pupillary reaction."

3. Lateral hemianopsia, or sector-like defects of the same geometric order, with hemianæsthesia and choreiform, or ataxic movements of one-half of the body without marked hemiplegia, is probably due to lesion of the caudo-lateral part of the thalamus, or of the caudal division of the internal capsule.

4. Lateral hemianopsia, with complete hemiplegia (spastic after a few weeks) and hemianæsthesia, is probably caused by an extensive lesion of the internal capsule in its knee and caudal part.

5. Lateral hemianopsia, with typical hemiplegia (spastic after a few weeks) aphasia if the right side be paralyzed, and with little or no anæsthesia, is quite certainly due to an extensive superficial lesion in the area supplied by the middle cerebral artery; we would expect to find softening of the motor zone and of the gyri lying at the extremity of the fissure of Sylvius, viz., the inferior parietal lobule, the supra-marginal gyrus, and the gyrus angularis. Embolism or thrombosis of the Sylvian artery would be the most likely pathological cause of the softening.

6. Lateral hemianopsia, with moderate loss of power in one-half of the body, especially if associated with impairment of the muscular sense, would probably be due to a lesion of the inferior parietal lobule and gyrus angularis, with their subjacent white substance, penetrating deeply enough to sever or compress the optic fasciculus on its way to the visual centre.

7. Lateral hemianopsia without motor or common sensory symptoms. This symptom alone is due, I believe, from convincing evidence, to lesion of the cuneus only, or of it and the gray matter immediately surrounding it on the mesial surface of the occipital lobe, in the hemisphere opposite to the dark half fields. Most surgical cases come at once, or after convalescence, within this rule, or in 6.

In all cases coming under 3 to 7 inclusive, the pupils react normally; and rarely does the ophthalmoscope show any lesion of the optic nerve, except, of course, in some tumor cases, when neuro-retinitis may be expected. In the A· ust number of the same periodical Dr. Seguin reports nine cases of hemianopsia in which no post-mortem examination existed to confirm the results of the study of the cases previously examined. Pathological diagnoses are put forward according to the analysis of previous cases submitted to post-mortem investigation. Two notable symptoms are discussed: the existence of hallucinatory images in the half fields that had just become blind, explained as the irritation of the cortical visual centre just previous to its destruction; the preservation of central vision in all cases of hemianopsia, the hemianopic half field always stopping short just without the macula.

The "Rational Method" of After-treatment of Cataract Operations, Iridectomies, etc.

This method consists in the rejection of bandages, compresses, and the dark room, and the substitution therefor of a strip of isinglass plaster applied to the lids and an ordinarily lighted room, the other conditions as to rest, etc., remaining as before, or according to the individual judgment or habits of the surgeon. These seem extremely radical changes of the routine treatment laid down by von Gräfe, and, with the few exceptions to be noted, universally followed by the profession. The advantages claimed for it by its supporters may be briefly classified as follows:

1. General. No special room is required; if in a private house, no artificial darkening; if in a hospital, the common wards may be used. Better ventilation, sanitary surroundings, and comfort are secured. The patient's friends or nurse may be with him in more cheerful conditions, may read to him without weak artificial light, etc. The long and dreaded period of darkness is obviated, the discomfort of a close bandage over the eyes is avoided, the inflammatory weakening and unhealthy effect of this padding and warmth to the lids and adjacent tissues done away with.

2. The examination of the eye is easy and thorough, and an earlier discovery of bad results is secured. This is chiefly because the eye, being in receipt of its natural stimulus all the time, does not become photophobic, and a more frequent and accurately thorough examination is at all times possible. Incipient inflammation, œdema of lids, etc., is detected, the secretions, such as tears, discharges, etc., are not pent up in the already suffering eye, but have at all times a natural and ready drainage through the not rigidly joined palpebral fissure. The introduction of mydriatic, myotic, or antiseptic medicaments is at all times easy, without any disturbance of dressings.

3. Dangerous complications and sequelæ are evaded. Even the lightest, most uniform, and carefully applied bandage must exercise a certain pressure upon the front of the globe; it would not be a bandage did it not do so; and a body as soft and pliable as the globe must be somewhat flattened, regularly or irregularly, as the case may be. But however little this pressure, asymmetry of the cornea must result, and with the inevitable result that coaptation of the lips of the wound is not perfect. Hence, two serious and persistent evils—prolapse and entanglement of the iris in the wound, and, after recovery, astigmatism—are avoided.

4. The period of confinement is shortened, and, from the absence of photophobia (assiduously *cultivated* by the old method), the duration and comfort of that of convalescence is rendered more desirable; whilst the tests and application of spectacles are sooner reached, followed by the earlier resumption of the ordinary habits of life.

The practical application and introduction of the method to the profession are due to Dr. Charles E. Michel, of St. Louis, who sets forth his reasons for adopting it, and the results of twelve or fifteen years of practice, in *Knapp and Schweigger's Archives* for September. From Michel, Dr. Chisolm, of Baltimore, learned the method, and, adopting it enthusiastically, reports his success in *The Maryland Medical Journal* of June 19th, and in the June number of *The American Journal of Ophthalmology*. Lastly, Dr. Simeon

SNELL, of Sheffield, England, being struck with the reasonableness of the plan as described by Dr. Chisolm, adopted it in his own practice, and bears witness to its value in *The Lancet* for September 18th.

Dr. Michel gives no definite statistics of his cases, but says that, " as the results were so uniformly satisfactory from the very first, I have never deemed it worth the time or labor of making out a statistical statement for comparison."   Dr. Chisolm states that the results of 24 cataract operations, 8 iridectomies and 7 capsulotomies were most gratifying, and "brilliant illustrations of this simple treatment."   Snell reports 18 cases in hospital and private practice, and, quoting Chisolm, endorses these words : " The revolution in the after-treatment of cataract and iridectomy patients in this hospital is complete.   From this time forth, all bandages, compresses, and dark rooms will be among the things of the past, to be remembered only for the discomfort they occasioned."   As to the plaster, each operator uses a different size and shape, Michel wisely urging that a large one communicates the motions of the face in chewing, speaking, etc., to the eye.   He uses a strip of gold-beater's skin, one-half inch wide by one and a quarter inches long, over the palpebral fissures, leaving the latter loosely joined.

PROF. THOMSON has banished dark rooms and thick compresses from the Ophthalmological Department of Jefferson Medical College Hospital since its opening in 1877.   The patients are placed immediately after an operation, done with antiseptic precautions, in the open wards of a general hospital ; the soft texture of a black knit, wool or silk bandage, with one thickness of patent lint placed over the eyes, is all the protection given.   The above method has proven so satisfactory, both to the personal comfort of the patient and visual recovery, that at a future time full statistics of his cases will be published.   We may mention that in the last series of one hundred cases, but two can be placed upon record as total losses, one by panophthalmitis the other by iridocyclitis which may yet be benefited by a future operation.

It will be seen that the "revolution" is based upon the fundamental axioms that light is the natural stimulus of the eye, and that the lids are its natural splints.   So far, therefore, as the application of these principles is consistent with the absolute demand for rest, the method seems to deserve its chosen epithet, "rational."

CHROMATIC SENSITIVENESS OF THE PERIPHERY OF THE RETINA.

In *Gräfe's Archiv*, xxxii. 1, DOBROWOLSKY gives the results of extended and careful experiments to determine the precise measure of the relative sensibility of the peripheral portions of the retina to chromatic stimuli.   He finds that exercise increases the sensibility, though at one sitting these parts of the retina are very soon fatigued.   Fraunhofer line C was chosen for red, D for yellow, E for green, F for cyan-blue, and G for indigo-blue.   The greatest sensitiveness is at the fovea, falling rapidly toward the periphery. At the centre a difference of $\frac{1}{340}$ of the intensity of red was detected ; 5° inward $\frac{1}{243}$; 20°, $\frac{1}{129}$; 35°, $\frac{1}{112}$; 50°, $\frac{1}{85}$.   5° outward $\frac{1}{161}$; 20°, $\frac{1}{105}$; 35°, $\frac{1}{74}$. Similar reductions took place with the other colors, the sensitiveness of the outlying field being relatively less for each color as the centre was less sensi-

tive to the color, though the rapidity of falling off was not the same for all colors. At 5° inward, sensitiveness to red and green fell by $\frac{1}{1.4}$ whilst to yellow $\frac{1}{2}$, to blue $\frac{1}{2.05}$; 5° outward the retina had lost $\frac{1}{2.1}$ of its sensitiveness to red, $\frac{1}{2.3}$ to green, $\frac{1}{2.7}$ to yellow and blue; 50° inward sensitiveness to red had decreased to $\frac{1}{4}$, to yellow to $\frac{1}{2.3}$, to blue to $\frac{1}{3}$. Taking the sensitiveness of the fovea to yellow as the unit of comparison, the relative sensitiveness of the centre to red is $\frac{1}{3.3}$; to green, $\frac{1}{1.909}$; to blue, $\frac{1}{1.044}$; to indigo, $\frac{1}{1.7}$. Comparing a single color, the centre being $\frac{1}{3.3}$ as sensitive to red as yellow, it is found that 5° inward it is $\frac{1}{2.3}$; 20°, $\frac{1}{3.6}$; 50°, $\frac{1}{4.57}$; externally $\frac{1}{2.54}$, at 5°; $\frac{1}{3.3}$ at 20°; $\frac{1}{3.35}$ at 35°.

ORIGIN OF STRABISMUS.

In *Knapp and Sehweigger's Archives* for September, 1886, PROF. J. STILLING advances an explanation of the origin of strabismus that must in a practical sense be considered as highly important. As a result of many tests and examinations the author finds the natural position of rest of the eyeballs (as, *e. g.*, in dreamless sleep) to be, *as a rule*, one of convergence in emmetropia and hyperopia, of divergence in myopia. Exceptions to this rule are, however, numerous; "parallel strabismus" is somewhat rare.

The position of rest is determined by the shape of the orbital cavity, the relations of the fibrous and soft structures to the globe, the position of entrance of the optic nerve, etc., but more especially by the muscular and refractive conditions. Squint in hyperopia is not due to the refractive condition as such, but to the fact that when the effort of binocular fixation is given up the eye returns to its natural position of rest, which is, as has been shown, one of convergence. The prevalence of divergent squint in myopia is explained in the same way; the position of rest of non-squinting myopic eyes is generally one of divergence. The practical bearing of this perception of the facts lies in the common failure to differentiate between physiological squint (the position of rest) and pathological strabismus. For example, when an eye is covered by the hand and thus excluded from binocular vision, it passes to its position of rest—a physiological condition that is often diagnosticated as pathological. Whether it be so or not is discoverable by the aid of prism tests alone.

Distal abduction in normal eyes is usually from 4° to 6°; adduction from 14° to 24°. Abduction of more than 6° and adduction of less than 12° are held to be abnormal. The chief obstacle to squint for ametropic eyes, the reason that it is not oftener developed, is, therefore, the same as for emmetropic eyes, viz., the inherent desire for and preponderance of binocular vision; this results in a continuous struggle of the ocular muscles to bring about the common fixation against natural obstacles. If an eye finds itself, from weakness of its muscles, from anisometropia or from a consensus of these and other numerous well-known causes, unable to keep up this struggle, binocular vision is relinquished and the eye passes to its condition of rest with the result called strabismus. But it may again be emphasized that a temporary return to its position of rest, while covered or disused, may be purely physiological and require no surgical or therapeutic interference.

CILIARY CORRECTION OF ASTIGMATISM.

In the *Annales d'Oculistique* for July and August, 1886, Dr. George Martin, with an abundance of evidence in the shape of reports of clinical cases, proves the fact of the compensation, to a limited degree, by the ciliary muscle of astigmatic irregularities of refraction. He distinguishes two varieties of this neutralization of corneal asymmetry; a permanent condition, consisting in a certain persistent tension of the muscle, and a variable contraction which appears when the desire for clearness of vision calls it forth. The first he calls the resistent, the second, the elastic contraction of the ciliary muscle. The author strongly and justly urges the employment of the Javal and Schiötz ophthalmometer as a certain means of learning in advance the existence of corneal irregularity, otherwise both patient and physician are put to the extreme inconvenience of extended atropinization only to learn that no astigmatism exists. Having detected the presence of the defect, the author finds whether it is resistent or elastic by the subjective examination before the distant letters. If the amity is normal, without correcting lenses, and if the correcting lenses are borne without more perfect amity, it shows that the lenses represent the play of the muscle in the elastic variety of compensation. Thorough atropinization alone reveals the resistent tension; as a matter of fact, the two varieties usually coexist. If the mydriatic reveal a greater astigmatism than the ophthalmometer showed, it proves the existence of lenticular astigmatism. But this latter type is extremely rare, corneal asymmetry constituting, almost without exception, the total astigmatism; when the crystalline is affected, it is found to be of the same kind as that of the cornea, so that the one is only an addition to the other. In emmetropes the strongest resistent contractions are 1.25 D., rarely 1.5 D.; the greatest elastic contractions are 0.75 D.; the average combined correction of the two usually is about 1.25 D. Resistent contractions in myopes are very seldom found, and of elastic, the author has found but two cases. Among hypermetropes the resistent tension is the stronger, and sometimes reaches the degree of 1.25 D., whilst the elastic does not rise above 1 D., the combined average commonly amounting to about 1.5 D. From the clinical cases reported it may indirectly be seen how dangerous and imperfect is the attempted correction of refractive errors without the use of a mydriatic, hypermetropic astigmatism, *e. g.*, frequently masking as myopic astigmatism, or *vice versâ*.

The author calls attention to the frequent existence of such general ocular disorders as palpebral cysts, lachrymation, asthenopia, phlyctenular ophthalmia, blepharitis, etc., existing as the direct result of the unequal strain put upon the ciliary muscle in its attempts to neutralize the imperfect focalization of corneal asymmetry. But the most noteworthy fact of this kind is the existence of *astigmatic keratitis*, a condition that is too often overlooked by ophthalmologists.

HEAT THE RETINAL INTERMEDIATE OF LUMINOUS SENSATION.

In the *American Journal of Ophthalmology* for July, 1886, appears an article by L. Webster Fox and George M. Gould, the object of which is to bring forward the hypothesis that the essential nature of the retinal function is a refined and delicate temperature-sense. They hold that the

older theories of light and color perception are illogical, not based upon experiment, and mutually destructive. Each and all are founded on the fallacy of the specific or differentiating function of the retinal end-organs, a theory that in other departments of physiological inquiry has been thrown aside. The authors consider the office of the retina in this respect to consist simply in the reception of the ethereal stimuli by the pigmentary layer into which the points of the rods and cones extend, and a transformation of the ethereal wave energies into its own molecular activity to heights or degrees precisely correspondent to the amplitudes or energies of the ethereal vibrations. The rods and cones register the height of this aroused molecular energy, and transfer by ordinary neural methods these registrations to the cerebral coördinating centres, where alone light and color are produced. The authors examine in detail arguments and corroboratory data drawn from the sciences of physics, physiology, chromatology, psychology, and pathology, but reliance is placed especially upon the physical law that the kinetic value of the ethereal stimuli can only become mechanical or neural in setting up molecular activity in particles of which the vibratory period is consonant with their own. The absolute energy of the ether-wave is too slight to produce work in any other manner. If this be so, they say, our measure of molecular activity is always in terms of heat-units; heat or temperature is the common name for such motion. It appears that this ingenious theory was worked out in ignorance of the fact that others had previously and tentatively advanced the same fundamental hypothesis—notably Swan M. Burnett, who, so long ago as 1881, rightly judges that a consensus of investigators arriving independently at a common understanding, argues a fatal defect in the older theories.

At first sight, the matter seems to possess only a purely theoretic or scientific interest, but, as is suggested, there is no truth once established but finds unexpected practical applications, and it is not difficult to see that experiment and investigation on the lines opened out by this thought may lead to decidedly useful results in reference to color-blindness and various retinal affections.

OTOLOGY.

UNDER THE CHARGE OF
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THE ORGAN OF HEARING IN LEUCÆMIA.

DR. GIUSEPPE GRADENIGO, JR., of Padua (*Archiv für Ohrenheilkunde*, Bd. 23, S. 242–263, July 15, 1886), has contributed an interesting brochure on this subject. The only case of profound affection of the organ of hearing, in consequence of leucæmia, heretofore fully described, both clinically and pathologically, is that of Politzer, presented at the Otological Congress, at Basle, in 1884. The other cases reported are given in their clinical aspects only.

According to the statistics of Vidal and Isambert, in ten per cent. of the cases of leucæmia there occur aural symptoms of a specific form. This percentage, however, is regarded by Gradenigo as perhaps too high. It is also very probable that aural affections are not as numerous as ophthalmic diseases in leucæmia.

The observations of Gradenigo were made upon a leucæmic subject with splenic disorder, who, in the last days of his life, manifested undoubted signs of hardness of hearing. His case was one of mixed leucæmia, with hemorrhagic diathesis, petechiæ upon the backs of the hands, hemorrhages from the bowels, and epistaxis. There were alterations in hearing in both ears, and death occurred from exhaustion. After obstinate epistaxis, which lasted for eight hours, occurring after the patient had been under observation for two weeks in the hospital at Padua, he experienced tinnitus aurium. Ten days later there was noted considerable hardness of hearing in both ears, which had been developed within a few hours. Two days subsequent to this the tuning-fork was perceived only when placed on the skull. The watch was heard only when placed on the auricle. In the left ear, whispering, 0 ; conversational tone heard 10 centimetres. In the right ear, whispering, 0 ; conversational tone, 15 centimetres.

After catheterization of the right Eustachian tube there was entire cessation of the noises in that ear, and an increase of hearing for the watch to 8 centimetres. Two days later, the patient complained of hearing worse, especially in the left ear. Inspection of the left ear revealed the presence of a grayish-red mass, extending across about one-third the lumen of the auditory canal. Syringing removed numerous red layers of epidermis, and a small clot of blood. A closer inspection showed that the aforesaid mass consisted of a sub-epidermal vesicle, containing fluid and coagulated blood, situated on the lower end of the canal, and stretching toward both the anterior and posterior level. This vesicle began about the middle of the cartilaginous part of the auditory canal and extended almost to the edge of the membrana tympani. The latter was reddened and swollen, the short process being the only part of the malleus remaining visible. The membrana tympani was greatly retracted, and its lower half appeared brownish in color, without distinctly defined outline, as though there were in the drum-cavity a blood-clot. In the right auditory canal there was a dark red, hemorrhagic spot on the anterior wall.

The diagnosis now made was "Otitis media chronica bilateralis, with recent hemorrhagic exudation in the external and middle ear."

During the subsequent few days there were epistaxis, evanescent petechiæ on the belly, and a gradual loss of strength. The deafness, however, seemed to diminish markedly. Death occurred in six weeks, being preceded by a recurrence of hemorrhagic diarrhœa.

Post-mortem examination of the drum cavities revealed in them the presence of a gelatinous yellowish-red substance which filled these cavities, and extended backward and toward the mastoid cells. The fluid pressed from this mass showed, under the microscope, both red and white blood-cells, varying in size, but containing no crystals of cholesterin or fat cells. The mass disappeared in fibrous texture. Further and later examination revealed the presence of new-formed connective tissue, containing hemorrhagic infiltration and remnants of free extravasations. The examination of the internal ear

gave a negative result, so far as concerned the presence of a leucæmic exudation.

The results of Gradenigo's investigations are summed up as follows:

1. In the course of a leucæmic process there sometimes occur in the organ of hearing complications which depend upon exudative processes in the middle ear or in the internal ear.

2. Such exudations may ensue independently of a hemorrhagic diathesis.

3. Either a previous or a simultaneous inflammatory process must be regarded as the essential predisposing factor in the aural complications.

ABSCESS OF THE BRAIN FOLLOWING OTORRHŒA—CURED BY OPERATION.

The patient, in this instance, was under the surgical care of Dr. Schede, in the General Hospital of Hamburg. The notes were collected by DR. MAX TOEPLITZ, and published in the *Archives of Otology*, Sept. 1886, vol. xv. pp. 176–185. In this case, as in that of Schondorff, alluded to by the writer (*Monatsschr. f. Ohrenheilk.*, 1885, No. 2), there was a well-defined, very painful spot on the skull, œdema confined to the same limit, and a fistula. The fistula, in Toeplitz's case, led no further than under the scalp (galea) into a rough place on the outside of the bone, while in Schondorff's case it led directly to the brain, and indicated the way by which pus had escaped. It is asserted that Schondorff's case is the only other one reported cured.

The patient, a man, twenty-eight years old, had had a suppuration from his left ear for six months preceding his entrance into the hospital, January 11, 1885. His hearing had gradually decreased, and he began to look icteric. He complained of a painful spot on the top of the head; formerly he had had vertigo; a chill four days previous. The auditory meatus was narrowed to a small transverse fissure; at the fundus the field was red, shining, and protuberant. Incision into the meatus and the red protuberance at fundus. Patient had a pyæmic appearance. Treatment of the ear after incisions was by syringing and dressings of lead-water.

Jan. 13. The dressing contained a small quantity of fetid pus. The subjective symptoms were good. Remission of headache, but the temperature rose. Treatment: Sulph. quin., 0.5 gr., in three doses.

14*th.* Dressings are dry. Pain again on top of the head and in the occiput. On account of the rise in temperature, Dr. Schede opened the mastoid by chiselling off the cortex, which was thickened by hyperostosis. After reaching a depth of five millimetres, thick, cheesy, offensive pus escaped from the cavity, on a line with the linea temporalis, about one and a half centimetres behind the external meatus. Syringing through the external meatus brought away large pieces of cholesteatomatous pus through the opening in the mastoid. Drainage was maintained, and the wound packed with iodoform gauze. The dressings were changed daily.

16*th.* The wound looked well and there was no febrile reaction. The fever remitted. The subjective symptoms were good.

24*th.* The evening temperature 38.6° C., with moderate pain between vertex and temple. The dressings were changed and the wound syringed through the external meatus.

27*th.* A notable elevation in temperature to 39.6° C. The dressings covered

with fetid pus. The wound filled with fresh granulations; the latter were removed to facilitate syringing.

28*th*. Temperature continues high. The opening in the mastoid was enlarged and energetically syringed; a thin strip of gauze was then inserted into the wound.

29*th*. Paresis of the *right* half of the face appeared over night, and the right angle of the mouth hung down obliquely; the tongue, when projected, deviated to the right and trembled. The patient was unable to contract his lips. Fluids were taken without difficulty. Both eyes were closed with equal facility. The patient showed a peculiar impediment of speech, using but few words, saying mostly "yes" and "no," mixing right words with erroneous ones, and reading in a stuttering voice; a word impulse which pleased once, would return repeatedly in his talk; his memory became defective, and he forgot his children, his name, and his age.

30*th*. High degree of aphasia. Dressings changed morning and evening. Syringing with 1 : 1000 sublimate solution. The bandages were now always wet through with pus. There was now observed slight œdema behind the ear, which greatly increased the next day.

The diagnosis of *brain abscess* was then made, and preparations for an operation instituted. The incision for chiselling the mastoid was extended upward about eight cm., and slightly backward. After detaching the galea and its periosteum, there was found, about three cm. behind and above the external auditory meatus, a drop of pus, "the size of a pin's head," protruding from a small fistula in the bone. After chiselling off an extremely thin and fragile piece of bone the size of a quarter, the dura was seen to be covered with red, button-like granulations. Pressure revealed distinct fluctuation. An exploratory puncture was made, which, however, resulted in the escape of only a trace of fluid with brain-fibres. At the same time, pieces of caseous matter, exceedingly offensive, came away continually from between the dura and the bone, and also small quantities of foul air. The incision was then extended downward and backward five cm., and the thin bone was further chiselled off. Again large quantities of pus were discharged, thinner than before, but equally offensive. An exploratory puncture at this point disclosed the presence of pus. After slitting the dura, about a cupful of pus escaped, and the sharp spoon (used as probe?) entered six cm. without reaching the wall of the abscess. The abscess was about the size of a small orange. Syringing with sublimate solution (1 : 1000) brought out a quantity of matter interspersed with flakes of brain-matter. Drainage of the cavity of the abscess was maintained, and dressed with sublimate gauze. The partly narcotized patient was able now to move the left orbicularis muscle, but not the right one. The patient passed the first few days almost entirely in sleep, then recovered rapidly, the fever having ceased. The impediments in speech did not quickly abate. Dressings always contained fetid pus in abundance.

Feb. 11. The patient up at his own request, and becoming more active. A slight weakness of his left leg passed off rapidly; speech improved.

12*th*. Drainage tube removed. A round spot of the dura mater, one and a half inches in diameter, was bulging and visibly pulsating.

19*th* to 21*st*. Vomiting after meals. Pulse only 60. Patient became dull, assumed a pyæmic appearance, and seemed collapsed at night.

22*d*. A portion of the dura, the size of a hazelnut, bulged outward, and was very resistent to pressure. After an incision, upward and backward, a quantity of thin, fluid, very fetid pus issued from this region.

Temperature remained normal, the patient recovered rapidly, and his physical functions reappeared. He quickly tired, however, after reading, writing, and, especially, ciphering.

March 23. Discharged from the hospital, and treated as an out-door patient.

In two months he returned with fever. The abscess was again opened and drained. After a week's drainage, the patient got up and left the hospital, cured. The wound healed completely in about three weeks. As late as October 16th, five months subsequent to this treatment, though he spoke fluently, the patient was unable always to recall a word promptly when desiring to use it.

It is remarked that the abscess was probably situated in the region of the second left temporal convolution. The diagnosis was based, 1, upon the œdema confined to the region already named; 2, upon the painfulness which existed there, and which became very great on pressure; 3, on the paralysis of the right facial nerve, and upon the peculiar impediment in speech.

The diagnosis is difficult, as some features are common to all three above-named conditions. A differential diagnosis is aided by the fact that meningitis generally begins suddenly. High fever, delirium, vomiting, stiffness of the neck, are then developed in meningitis, whilst symptoms of abscess in the brain come on slowly, on account of its frequently prolonged latency.

The symptomatic points in brain-abscess have already been given. Thrombosis in the lateral sinus is characterized by painfulness along the sterno-cleido-mastoid muscle, and especially by a swelling of the external jugular, which can be easily felt. Later, chills and high temperature may set in, great œdema of the throat develops, and paralysis of the vagus and glosso-pharyngeus is also described as likely to ensue.

DERMATOLOGY.

UNDER THE CHARGE OF

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THE TREATMENT OF LUPUS BY LOCAL APPLICATIONS.

As stated by UNNA (*Lancet*, Sept. 25, 1886), the fact that the mechanical treatment of lupus is rarely sufficient to ward off recurrence, is ample justification of experimental attempts to transform the treatment into one of medical application. In using salicylic acid plasters in lupus cases for the removal of the cuticle preparatory to the employment of more destructive

agents, the writer noted that the salicylic acid plaster alone had a favorable influence on the new growth; and if strong plasters were employed, not only was the horny layer separated from the patch, but the tubercles themselves were destroyed and removed. This observation led to the use of salicylic acid in a series of lupus cases, without the assistance or subsequent use of any other remedy. The results were good. The lupoid deposits are destroyed, and the healthy interstices left untouched. The drawback to its use, however, was in the unavoidable pain which it causes when applied to thin epidermis and especially to raw surfaces. The pain is considerable, and lasts as long as the plaster remains on. In various experiments to obviate this, the addition of creasote (pure beech-tar creasote is required) proved the most valuable. In fact, this addition to the salicylic acid plaster rendered the application practically painless. It is only during the first ten or fifteen minutes that this compound plaster gives rise to any pain, and this may be avoided by painting over the raw surface a four per cent. solution of cocaine. The applications were made in the form of plastermulls.[1] These plasters were employed in various strengths. Those containing 10 grammes of salicylic acid and 20 grammes of creasote to the one-fifth square metre suffice for ordinary cases of lupus of the cheeks and nose.

For lupoid nodules embedded in old sclerosed scars, and in the warty form of lupus, stronger plasters are required, 30 to 50 grammes of the acid and 50 grammes of creasote to the one-fifth square metre of plaster. The thinner the epidermis and the better supplied with capillaries a tissue is, the less salicylic acid is required. Besides its property of dulling pain, the creasote has another value—its antiseptic power. The strongest plaster suitable for the case should always be employed at the commencement, changing once or twice daily, and cleansing the parts at each renewal; as soon as the lupus nodules have fallen out, it is discontinued and a weaker plaster used. When the lupus deposits seem totally destroyed, simple healing remedies may be employed. The author considers this the simplest possible form of the treatment of lupus, the salicylic acid causing a continual exfoliation of the affected area, and the creasote rendering the process painless, and having as well a destructive action on the bacilli. The resulting scars are smooth, but the redness lasts somewhat longer than with other methods.

The Treatment of Lupus by Erasion.

In *The Practitioner* (Oct. 1886) STOWERS relates his experience in the treatment of lupus. According to the author's observation, lupus is more intimately associated with phthisis and destructive pulmonary disease than is generally allowed. In fifty-two per cent. of his cases the notes showed that phthisis occurred in one or more members of the family. This being the case, the importance of proper constitutional treatment, in conjunction with the more positive external measures, is evident. Erasion, by means of the curette, has, in the author's hands, given satisfactory results. The operation, except in those cases in which the disease is superficial and very limited, is best done

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[1] Plastermulls consist of a very thin sheet of gutta-percha, coated on the one side with an adhesive substance (aluminium oleate) containing one or more medicinal substances, and backed on the other side with mull (undressed muslin).

under ether, as then the cell-growth may be the more carefully and thoroughly scraped out, and good after-results secured; with cocaine, as a local anæsthetic, either as painted over the parts or injected subcutaneously, the writer's experience has been unsatisfactory. As soon as the bleeding has stopped, and the parts are freed of the coating of serum by means of lint or blotting-paper, thorough cauterization with the nitrate of silver stick follows. Subsequently a dressing of carbolized oil (1 in 40) is employed, being renewed twice daily; under this healing takes place. As new foci of disease appear, recourse is immediately to be had again to the curette. This method of treatment leaves eventually a pale and insignificant scar; and of the many plans familiar to the writer he has found none so efficient as that here described.

Mollin: A New Soap Preparation as a Vehicle for Cutaneous Medicaments.

Kirsten (*Monatshefte für praktische Dermatologie*, No. 8, 1886) has had prepared a soap in which there is present an excess (17 per cent.) of the fatty constituent. To this the name "mollin" (mollinum) has been given. The exact formula is as follows: 100 parts fat, 40 parts lye (both potash and soda lye, chiefly the former), to which, when saponification has about taken place, 30 per cent. of glycerine is added. It is of a dull white color, of ointment consistence, stable, unirritating, and permits of even and thorough application without the addition of water. In this last property lies its superiority to similar soaps already introduced. Its main use, rubbed up with mercury, is to be found in the treatment of syphilis by inunction, as a substitute for blue ointment. In comparison it is cleanly and of more positive therapeutic effect. Another equally valuable combination is mollin with styrax for the treatment of scabies; it is applied in the same manner as an ordinary ointment, but has the advantage of being easily removed by simple washing. Various other drugs, such as tar, sulphur, ichthyol, chrysarobin, salicylic acid, etc., may also be advantageously prescribed with this preparation.

Trophoneurosis of the Skin caused by Injury to the Median Nerve.

Tilden reports (*Journ. Cutaneous and Venereal Diseases*, October, 1886) a case of nerve injury which was followed by peculiar cutaneous symptoms. The wound, seated at the wrist, healed satisfactorily. Several days after the injury there developed a progressive loss of tactile sense and a numbness of the fore and middle fingers. Some days later, and subsequently at intervals of a few weeks, on the same parts, pea-sized, tense bullæ, with clear serous contents, appeared. The bullæ develop rapidly, without subjective symptoms, upon a slightly reddened base, and, once formed, do not increase in size. On removal of their covering is seen a superficial excoriation which soon disappears. When several such lesions have appeared on the same spot a condition of tylosis is brought about. One of the bullæ, the largest noted, gave rise to an ulcer which subsequently was transformed into a crater-like callus, the thickened epidermis being arranged in concentric rings around the crater, which presented a small blood-crust covering an excoriation. The skin over the fingers named is tense, whitish, of a glossy texture, and on palpation the

tissues seem to be more resistant and less elastic than those of the uninvolved fingers. The nails were not implicated. The application of the faradic current relieved the symptoms considerably while under treatment, but the improvement was not permanent.

A Pemphigoid Eruption from Potassium Iodide, with Fatal Termination.

The notes (*Berliner klin. Wochenschrift*, 1886, No. 35) of a case of poisoning by iodide of potassium, are contributed by Wolf. The patient, a female, aged forty-eight years, was under treatment for subacute nephritis, and she had so far recovered from the attack as to permit release from bed, and other privileges accorded to the convalescent. At this time potassium iodide was ordered, a dose of six grains four times daily. At the end of the first day, as subsequently learned, feverishness and headache were experienced. In spite of these symptoms the patient on the following day took three doses, but, in consequence of the violent coryza and the appearance of a white blister on the bridge of the nose, the drug was discontinued. On the next day the writer saw the patient, the first time since the potassium iodide had been prescribed. The face presented a shapeless, puffy appearance, and from between the swollen eyelids was discharged a thin, brownish pus. Over the face, head, and neck were seen papules and pustules, and bullæ, the last-named being present in predominant numbers.

The papules and pustules were apparently of the same character as the ordinary iodide acne so commonly seen. The bullæ were of variable size and shape some of a grayish-white, and others of a reddish or bluish-red appearance, the latter filled with a bloody, or sero-sanguinolent fluid. They were seated upon normal or œdematous skin, and mostly round or oval, but in some places, from confluence of several smaller lesions, they were large and irregularly shaped; more scattered, but also with their characters more clearly shown, could be seen similar bullæ upon other parts of the body. With the majority of the blebs the size was about that of the thumb-nail. In some respects, the bullæ, in their general aspect, resembled those seen in gangrene. There were no positive subjective symptoms, the feeling of heat at first experienced having disappeared.

The pemphigoid eruption did not confine itself to the skin, but involved the mucous membrane of the nose, mouth, throat, and, apparently, the larynx. An examination of the secretions and excretions failed to give any evidence of iodine. Temperature and pulse-frequency were slightly increased. On the following (the fourth) day the condition was about the same, except there was slight diarrhœa, the stools showing the presence, in moderate quantity, of blood. No new outbreak of lesions occurred. The floor of the ruptured or broken blebs was covered with a whitish, macerated, smeary-looking substance. On the face the blebs gave way to tolerably deep ulceration. An examination of the heart disclosed a systolic murmur. Under gradual but rapid collapse, death took place on the ninth day. There was no autopsy.

A Case of Bullous Eruption Following the Administration of Salicylic Acid.

An example of an eruption of a bullous type, following the administration of salicylic acid, is given (*Deutsche medicinische Wochenschrift*, No. 33, 1886)

by ROSENBERG. The patient was a robust female, who applied for treatment for acute rheumatism. At a former attack, some months previously, according to her statement, salicylic acid was employed, but in spite of its favorable effect on the rheumatism, its discontinuance was deemed advisable in consequence of a macular eruption to which its use gave rise. On account of the severity of the rheumatic pains at the time of coming under the writer's care, salicylic acid, four grámmes in the course of the day, was prescribed. This had a positive effect on the pains, but produced a feeling of intense heat in the skin, an œdematous swelling of the eyelids, a turgescent condition of the face, and a bluish-red macular eruption; there was also a marked elevation of the temperature. The same quantity was given the second day, but in consequence of the intolerable burning in the skin the patient opposed its further administration. A day later, on account of the return of the rheumatic pains, the remedy was again given, three grammes in the day. The burning feeling in the skin, the elevated temperature, and a fresh outbreak of the bluish-red macules resulted. Many of these macules developed into blebs. A change of treatment was then instituted.

The blebs, which were whitish, and for the most part on the back and extremities, were seated upon a red basis, and varied in size from a ten cent piece to a half dollar. In shape they were rounded, but occasionally their form and size were changed by confluence of several of the individual lesions. The contents were of a clear yellowish color, and gave an alkaline reaction. The bullous eruption developed three days after the first dose of the acid had been given. Not only was the skin the seat of the macules and blebs, but also the mucous membranes. Three days after the medicine had been discontinued, the eruption began to decline, the blebs drying to crusts, and the macules becoming paler and assuming a brownish tinge. The turgescent condition of the face disappeared, followed by a branny desquamation which subsequently involved the whole body. Later, with the patient's consent, the salicylic acid was again administered, and the same eruption developed, proving beyond doubt that the drug was responsible for the cutaneous disturbance.

With the object of determining whether the salicylic acid was excreted by the skin, chemical examination of the contents of the blebs was made, but with negative results. Experimentally a small quantity of salicylic acid lanolin salve was repeatedly rubbed into the skin; no general symptoms followed, but at the place of application macules, identical to those called forth by the internal administration of the acid, appeared. This result, the author states, seems to prove that the eruption was due to the direct irritative action of the salicylic acid circulating in the blood upon the skin.

THE ETIOLOGY OF PSORIASIS.

BEISSEL makes the statement (*Monatshefte für praktische dermatologie*, No. 9, 1886) that in microscopic examination of the scrapings of the part immediately overlying the papillary layer of the skin in psoriasis patches, he has found a fungus apparently corresponding to that which Lang has called attention. Experimental inoculation with this fungus (obtained by culture) produced an intense hyperæmia at the points of inoculation, which, after a

day or two, began to fade; there then formed a small reddish areola imme-
diately around the inoculated part, on which a distinct, well-marked scaling
was noted to occur. Such lesions remained for several weeks, and then, after
repeated soap-washings, disappeared. The author believes, therefore, that
this fungus is an important etiological factor in this disease.

THE IODOFORM RASH.

As stated by TREVES (*Practitioner*, October, 1886), the extensive use of iodo-
form in the past few years in the treatment of wounds has resulted in a
number of examples of iodoform poisoning from absorption. In a proportion
of the cases, as met with in one of the author's cases, a general skin eruption
was one of the toxic symptoms. According to recorded cases of poisoning by
iodoform, this symptom is comparatively rare; but it is possible that in some
instances it may be overlooked or misinterpreted. It is a definite eruption, as
are the eruptions that follow the internal use of iodine, or iodide of potassium.
There are, indeed, two eruptions which its use may call forth. The one,
however, is entirely local in character, due to the direct action of the iodo-
form, consisting of a vesicular eruption upon an inflamed and œdematous
surface—a dermatitis, in fact, and may possibly depend upon some impurity
in the drug. The other eruption, and that of which the author especially
writes, is due to its absorption, and consists essentially of erythematous
patches of general distribution. The patches, which are usually well defined,
may be simply erythematous in character, non-elevated, or they may consist
of minute, closely aggregated papules, seated upon a pinkish-red base (as in
the author's case), or they may be sharply circumscribed, raised, and bright
red, not unlike urticaria. The eruption due to the local irritating action of
the drug may be produced by one application; that due to absorption makes
its appearance after the drug has been employed for several days or longer,
and then usually after or along with other toxic symptoms.

THE TREATMENT OF KELOID AND HYPERTROPHIED SCARS BY ELECTROLYSIS.

In the treatment of these disfigurements, HARDAWAY (*Medical Times*, May
29, 1886) contributes his experience with electrolysis. The first case was
that of a woman who had been treated elsewhere for the removal of super-
fluous hair with caustic injections in or near the hair follicle, with the sole
result of a large number of irregular hypertrophied scars. In the endeavor
to remove the hairs, now twisted and tortuous, by electrolysis, it was neces-
sary to plunge the needle in and about the distorted follicles. As treatment
progressed it was found that, in addition to the permanent removal of the
hairy growth, the scars were smoothed out, and finally became flat. In the
second case there was an elevated radiating scar upon the forehead, following
an electro-cauterization for the removal of a port-wine mark. In this instance
the smoothing down of the growth as a result of treatment by means of elec-
trolysis was striking. In a third case, a patient aged thirty, there was a
keloidal growth on the right side of the chest, a few inches below the clavicle,

as large as a silver half-dollar, and a fourth of an inch in height. The keloid was the seat of constant pain and burning. The electrolytic needle was at various times plunged into the surface of the growth and through its base. As a final result there was left, in place of an elevated keloidal tumor, a small white scar scarcely raised above the level of the skin.

Erythema Multiforme: its Nature and Treatment.

The conclusions regarding the nature and specific treatment of this disease reached by Villemin from a study (*Bulletin de l'Academie de Médecine*, 1886, No. 20) of personal cases may be briefly stated as follows:

That the affection is a general disease of a specific nature, and that the cutaneous phenomena, as well as the usual accompanying pains and swelling in and about the joints, are merely symptomatic—the joint symptoms being in no way related to rheumatism, as generally supposed. And, in the matter of treatment, that the potassium iodide, in the quantity of about thirty grains daily, has a specific action, exercising a surprising influence on the disease in the course of twenty-four to forty-eight hours.

Scarlatina and Scarlatiniform Eruptions following Injuries and Other Operations.

I. E. Atkinson (*Journ. Cutan. and Ven. Dis.*, Oct. 1886) lends his aid toward simplifying the subject of scarlatinoid eruptions following injuries and operations. These eruptions, for the most part, are due to the scarlet fever poison, and are, in fact, as generally recognized, true scarlatina. As observations by others, and also by the author, show, however, many of these rashes are due to other causes. In support of this may be mentioned the septicæmic rash, the scarlatinoid eruptions following the ingestion of certain drugs frequently administered at, or subsequent to, the time of the operation, etc., and which are not infrequently accompanied by general systemic disturbance and a reddened and painful condition of the throat.

The points brought out by the paper, the writer thinks, justify the following conclusions: 1. Unprotected persons who have suffered injury, or who have undergone surgical operations, are rather more liable to scarlatina than the unprotected healthy. This increased liability is probably due to diminished power of resistance from disease, and will probably hold with regard to other specific fevers. Scarlet fever is more apt than the other exanthemata to attack such persons, because its influence is usually more widespread, and because it varies within such wide limits that it often escapes the attention of those who readily detect other infectious disorders, and provide against them. 2. When an epidemic tendency of the symptoms we have been considering to prevail after injuries and operations is shown, it may be concluded with confidence that true scarlatina is present. 3. Septicæmia is occasionally accompanied by a scarlatiniform rash which does not depend upon the scarlatinal poison. 4. Medicinal eruptions, especially those from cinchona and its preparations, not infrequently follow injuries and operations. These rashes are, for the most part, usually attributed to true scarlatina or septicæmia.

MIDWIFERY AND GYNECOLOGY.

UNDER THE CHARGE OF

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THE PREGNANT AND PARTURIENT UTERUS.

This contribution by SCHRÖDER and his pupils (*Contributions to the Anatomy and Physiology of Obstetrics*, edited by Professor Schröder, with the coöperation of Drs. Hofmeier, Ruge, and Stratz. Bohn: Cohen & Sohn, 1886) comprises the description of a frozen section of a case where death took place at the beginning of the first stage: a description of the anatomy and physiology of the lower uterine segment by Hofmeier, and a consideration of the physiology of the second and third stages of labor by Schröder and Stratz. At present we omit the abstract of Ruge's paper. Hofmeier's views have been already given in this journal for July, 1886, p. 273.

The first section, by SCHRÖDER and STRATZ, is that of a patient who died four hours after admission to hospital, and where labor was only advanced as far as the early part of the first stage. The fœtal heart was not heard, and the membranes were unruptured. On vaginal examination, the os uteri was found dilated as large as the palm of the hand, the small fontanelle to the left, and the sagittal suture in the transverse of the brim. The general condition of the patient was hopeless, both lungs being œdematous, urine half albumen, and a systolic murmur at apex. The abdomen was greatly distended. The whole body was frozen, sawn in the mesial line, figured, and special drawings given of the interior surface of the uterus and of the fœtus. In the sagittal section the special interest centres on the conditions of the lower uterine segment, cervical canal, and pelvic floor.

Cervical Canal. The anterior wall measures 3.7 centimetres, and the os internum is sharply marked off from the uterus. The posterior wall of the cervical canal is drawn up so that its lower tip is 3.4 centimetres distant from that of the anterior wall. The posterior wall of the cervical canal is elongated to about 5.5 centimetres. In this way, the antero-posterior diameter of the os internum is 4.8 centimetres. Above the os internum, in front as well as behind, the uterine wall is especially thin. This is the stretched lower uterine element, whose upper boundary, the contraction ring, is 5.5 centimetres above the os internum in front, and 3.5 centimetres behind.

In this patient, therefore, the first effect of labor was to canalize the lower uterine segment and cervical canal, and to give measurements as follows:

	Os externum to os internum.		Os internum to C. R.
In front	. . 4.2 centimetres	+	5.5 = 9.7 centimetres.
Behind	. . 5.5 "	+	3.5 = 9.0 "

This confirms Chiari's statement (v. p. 000), and shows that Braune's os internum, his contraction ring, and his cervical canal, are really cervical canal plus stretched lower uterine segment. The plate of the internal surface of

the uterus shows the membranes separated up to the contraction ring, and the placenta diminished in area, but not separated.

The application of these statements is now made in the article on the "Physiology of the Stages of Labor." According to Schröder and Stratz, the uterus at the end of pregnancy is made up of three different parts, viz., the part of the uterus capable of retraction, the lower uterine segment, and the cervix. The lower boundary of the first part is where the peritoneum becomes loosely attached, and where large veins are met with on section. Below this is the lower uterine segment, where, during labor, we have no active contraction. The boundary between lower uterine segment and the active portion of the uterus is the contraction ring, while the os internum separates lower uterine segment and cervix. By uterine retraction, the contraction rings rises, and the lower uterine segment and cervical canal open up from above down. The capacity of the retracting portion of the uterus diminishes, and the uterine contents are driven into the expanded lower uterine segment and cervix.

It is remarkable that during labor, while the child is being driven down, the fundus uteri remains high and at the same level, viz., toward the right side, usually, and below the ribs. The authors explain this by asserting that the descent of the child is the result of its elongation and the separation of its breech from the fundus uteri. To prove this they give the results of measurement and palpation. They assert that while the first stage is completed by uterine retraction, the second is finished by intra-abdominal pressure alone. As Ahlfeld has shown, the doubled-up child in utero measures half its length when extended. This position of the child is not due to uterine pressure but is primary. Before labor, the uterus takes the shape or impress of its surroundings, but during labor it becomes rounded, the long diameter shortening, and the transverse and antero-posterior becoming greater. This shape, however, also depends on the primary shape of the uterus, whether fusiform or arcuate. In the latter the transverse diameter preponderates, and the fundus may have a median depression.

Measurements of the fœtus during labor give results which can only be explained by supposing that the fundus is not in contact with the breech. This space is filled with liquor amnii or the feet of the fœtus. Drawings are given to illustrate this. The authors point out also that usually the uterus is rotated on its long axis, the left angle of the fundus being toward the front, and that, owing to the right lateral obliquity of the uterus, the contraction ring is higher on the left side and the left round ligament more elongated than the right.

In regard to the mechanism of the third stage they hold that Schultze's mechanism is the more usual, but that Duncan's may occur in some cases. As to the management of the third stage, they recommend waiting until the placenta is driven below the contraction ring, and then suprapubic pressure to help when necessary.

[While there is very much that is valuable in Schröder's work, the proof as to the breech of the child leaving the fundus during the second stage seems incomplete, and is not borne out by any sections. The statement that during the second stage the uterus is not a factor, is novel, but is not supported by sufficient evidence. Granting even that the breech has left the fundus and that liquor amnii lies between, why should not the uterine retraction act on

the child through the waters? The account of the third stage mechanism is not what is held in this country and ignores many facts to the contrary.—Ed.]

Tumors Complicated with Pregnancy.

Stratz (*Zeitschrift für Geb. und Gynäk.*, Bd. xii. Heft 2, S. 262) gives the statistics of the cases of tumors complicating pregnancy in the Berlin Hospital, under Schröder's charge, since April 1, 1886. The tumors considered are ovarian, fibroid, and carcinomatous.

1. *Complication of ovarian tumors with pregnancy.* Of these there were 19 cases. In 5, the complication was at labor; one mother died, and only two children were rescued. In the 14 where the complication was met with during pregnancy, no mother died and 13 children were saved.

The 5 cases met with in labor were as follows: 1. Frau K., twenty-five years old; fifth labor. Labor long, and a face case. Child died soon after birth; mother recovered. 2. Frau K., twenty-four years old; primipara. Patient sent into hospital after labor, which was long. Ovariotomy seven weeks post partum; mother recovered. 3. Frau M., twenty-four years old; second labor. Received into clinic after labor. Diagnosis, "ovarian tumor, ascites, and peritonitis." The tumor had been twice punctured during pregnancy, fever following the second tapping. Labor long. The tumor was removed three weeks after labor, and the patient died in three weeks from septic peritonitis. 4. Frau B., twenty-eight years old, and primipara. Tumor in pouch of Douglas, and pregnancy at tenth month. Reposition of the tumor under anæsthesia and induction of labor were had recourse to. Mother recovered and living child delivered with forceps. 5. Frau D., thirty years old; primipara. Long in labor, and with right-sided ovarian tumor. Forceps could not be applied, and uterus ruptured during attempt to turn. Recourse was had to perforation. The tumor was not punctured. Patient recovered after three months' illness.

The results given are thus unfortunate, only one patient making a normal recovery. The fifth case had a very bad puerperium—only one child was fully developed, and could not be born alive. Of the three premature, only one survived.

From statistics of Litzmann, Playfair, Wells, and others, Stratz finds a total mortality of 30 per cent. for the mothers. Later results, however, are better, and it is possible, as Olshausen suggests, that only specially difficult cases are published.

2. *Complications with ovarian tumors during pregnancy.* Of these there were 14 cases, in all of which ovariotomy was performed. In all, the mother recovered; one aborted from peritonitis; a second, where the operation was difficult, aborted seven weeks after the operation, the child being at the sixth month and living. It is to be noted, however, that in this case the uterine sound had been used before the operation. A third and difficult case had premature labor at the eighth month, five days after the operation. Twelve children (once twins) were born at full time. The results are thus much better than those collected by Olshausen, viz., 8 deaths in 82 cases.

Stratz discusses the question as to whether ovariotomy is the best treatment, and whether it should be done in all cases, and comes, of course, to the con-

clusion that it should be employed always. This has been long held in Great Britain. He mentions specially a case where Pippingsköld, of Helsingfors, performed ovariotomy successfully seven hours before labor. Tapping complicates a case always, the mortality being 19 to 50 per cent. (Fock and Peaslee). It should be an aphorism, therefore, that the complication of an ovarian tumor with pregnancy indicates ovariotomy.

3. *Complications of myomata with pregnancy.* Twelve cases are recorded where difficulties occurred. Of these, no mother died, but a living child was delivered but twice. Of the 12 cases, 1 is still under observation, and thus 11 have full results. Of these there was spontaneous interruption of pregnancy in 4 cases; in 3, abortion was induced; twice, the pregnant uterus and tumor were removed; 1 myomotomy, and 1 enucleation per vaginam were performed. In the last two cases, living children were born. The myomotomy was performed on a pedicellated fibroid, and the enucleation on a fibroid of the anterior lip. Thus maternal mortality was *nil* and 18 per cent. of children saved.

4. *Complications of myomata with labor.* There were 13 cases; of these, 7 mothers died (53.8 per cent.), 2 had had bad puerperia, and only 4 passed a normal puerperium; 8 of the 13 children were saved (61.5 per cent.). Fibroids are thus much more difficult to recognize and treat, and the induction of abortion seems the best method of treatment, unless in special instances.

5. *Complications of carcinoma with pregnancy.* Five cases were noted. 1. Carcinoma portionis; supravaginal amputation. 2. Carcinoma portionis, and four months' pregnancy; supravaginal amputation; abortion four days after operation. 3. Carcinoma portionis; abortion. 4. Carcinoma portionis; four months' pregnancy; supravaginal amputation and abortion followed. 5. Carcinoma of anterior lip; amputation and premature labor about three weeks after (nearly seventh month). Thus no maternal death and no full-time birth.

6. *Carcinoma complicated with labor.* Seven cases are given. Mortality to mother, 4 immediately after birth, and 2 in consequence of it. Four living children were obtained. Treatment was as follows: Case 1. Sectio Cæsarea. Case 2. Turning; child macerated. Case 3. Forceps; child living. Case 4. Spontaneous birth, followed by supravaginal amputation three weeks after. Case 5. Spontaneous birth; supravaginal amputation three weeks after. Case 6. Cross birth; turning. Case 7. Sectio Cæsarea, and Freund's operation; mother died in an hour.

CONTRIBUTION TO PORRO'S OPERATION.

KLEINWÄCHTER (*Zeitschrift für Geburtsh. und Gynäk.*, Bd. xii. Hft. 2) considers the fact that we have already a history for Porro's operation, now scarcely ten years old, a proof of the rapid rate of life of the present time. He first takes up the history of its proposal in 1876 by Porro, and that of the various modifications by Müller, Litzmann, Veit, and others, as well as the attempts by Fehling, Heusner, King, Schmalfuss, to alter the extraperitoneal treatment of the stump. The opposition of Sänger's revival of the old Cæsarean section and his alteration especially in regard to the method of suturing the uterine wound is very briefly alluded to.

In judging of the value of Porro's operation, Kleinwächter points out that

it may be done unnecessarily—*e. g.*, on moribund women; on those dying from œdema of the lungs; in rickety pelvis, with a conjugate of 7.8 cm. ($3\frac{3}{25}$ inches). It is but fair to take the mortality of Porro's operation in suitable uncomplicated cases, and then it will be found to be small. Osteomalacia cases are specially suited for Porro's operation owing to the favorable influence on the disease that the removal of the uterus exerts. This has been granted even by Sänger.

Kleinwächter believes osteomalacia to be endemic in certain parts, and in the Austrian province of Bukowina he has seen several cases. In two of these he performed Porro's operation.

Case I. Patient was a Jewess who had a normal labor in 1876, and suckled her child two years. A second birth occurred in 1878; this child was suckled for one year and a half. During her third pregnancy she was not well, having severe pains in her back, sacrum, and legs, and found walking troublesome. Her third labor was difficult and long. After this she altered notably, became smaller, and could only drag herself along with difficulty. Suckling again lasted a year and a half. She menstruated for the last time on January 20, 1884, and now became much worse and unable to walk.

Kleinwächter was summoned to her labor on November 1, 1884, and found an anæmic, ill-developed woman, with the most wretched surroundings possible. The special pelvic measurements were as follows:

Between the spines	23.5 cm.
" " crests	26.75 "
" " trochanters	25 "
External conjugate	18.5 "
Between ischial tuberosities	3.75 "

The condition was evidently osteomalacic. On internal examination the promontory was found deep in the pelvis, the pelvic ring compressed laterally and antero-posteriorly, and the pubic bones and ischia so crushed in that a finger could scarcely be passed. Behind the ischial tuberosities two fingers could be inserted. The fœtal head could be touched per vaginam with the greatest difficulty; the cervical canal admitted the finger, and the membranes were intact. Cæsarean section was thus imperative.

The abdominal incision was easily made, and, after the peritoneal cavity was opened, it was extended to five centimetres above the umbilicus. As the intestines were kept back with difficulty, Kleinwächter was afraid to try Müller's modification, and accordingly opened into the uterus *in sitû*. The child, a girl, was seized and brought out—right arm, left arm, breech, and lastly head, and was alive. The bleeding from the uterine wound, owing to the position of the placenta there, was considerable. The placenta was removed, the uterus turned out of the abdominal cavity, and constricted with an India-rubber tube in the region of the cervix. The uterus was then cut off a few centimetres higher up. The stump was treated extraperitoneally, the constricting tube being fixed with needles, and Wells's clamp above these. A drainage tube was passed in at the lower end of the wound, and the pedicle and its cavity powdered with iodoform. All antiseptic precautions were used, except the spray. Patient recovered, and in March, 1885, was able to walk.

Case 2. The patient was also a Jewess, and had four children. The first two children were born at full time and without difficulty. The first child was suckled for six months, the second for more than a year and a half. In 1882 she had an abortion, and in 1883 twins, which, though small, were born with difficulty. The practitioner at that time recognized osteomalacia. Pain in the sacrum began in 1881. In 1884 she was unable to walk, and after that became smaller. In October, 1884, she became pregnant, and on the 9th of June, 1885, began to have pains. A medical man was not summoned till the 11th, and Kleinwächter saw her early on the 12th. The case was again one of osteomalacia, with miserable social surroundings. Height 148 cm.; in lumbar region, lordosis and left scoliosis. Pelvic measurements:

Between spines　.　.　.　.　.　.	25　centimetres.
Between crests　.　.　.　.　.　.	27.5　"
Between trochanters　.　.　.　.　.	28　"
External conjugate　.　.　.　.　.	19　"

Marked pendulous belly, and uterus size of eight months pregnancy; fœtal heart gone and pains strong. Through the vagina, one could feel the skin of fœtal head, separated from the bones, bulging down, but the pelvic bones could not be separated by force. The patient was in bad condition for operation; pulse 120.

Operation: The special points were, adhesion of omentum to peritoneum; uterus only the size of a man's head; no difficulty with intestines. Round the uterus, while in situ, an India-rubber tube was passed above the cervix and tightened. It could be felt that part of the fœtus was thus grasped, owing to the projecting downward into the vagina of the fœtal scalp. When the uterus was opened, gases escaped, and as the extraction of the fœtus was difficult owing to its scalp being snared in the constricted lower uterine segment, the India-rubber tube had to be relaxed. The fœtus was dead and putrid, and the head sausage-like, sixteen to eighteen centimetres long.

Kleinwächter was able to note the spontaneous expulsion of the placenta; it came as follows, the implantation being on the posterior uterine wall: The uterus lessened in bulk, and the placenta, apparently smaller, became elevated as well as thicker, the elevation being most marked at the centre. The edge was still adherent and no blood came. The placenta became still more elevated in its centre and was finally pushed out at the wound, fœtal surface to the front. The edge then separated, blood escaped, and the placenta passed out fœtal surface down. The India-rubber tube required to be adjusted higher, so that on the left side it was above, on the right side below, the ovary. The uterus (upper two-thirds) and left ovary were thus cut away, and the right ovary removed separately. The pedicle was, with difficulty, made extraperitoneal, and required to be sutured to the wound below the India-rubber band. Little blood was lost and the peritoneal toilette was carefully made. The patient recovered and her osteomalacia somewhat improved.

Kleinwächter points out that of the chief nationalities in Bukowina (Roumonians, Jews, Germans, and Poles) osteomalacia is almost exclusively found among the Jews. Although superior mentally to all but the Germans, they are yet poor, badly fed, and under bad hygienic conditions. The excessive time they suckle their children so as to prevent a new conception, is, in K.'s opinion, an important factor in determining osteomalacia. In both cases the

stump, after the portion above the ligature had sloughed off, passed back into the abdominal cavity. Kleinwächter points out the disadvantages of the extraperitoneal treatment of the pedicle, and considers the intraperitoneal treatment as the ideal to be aimed at.

[There is little to add to this valuable paper. The mechanism of the expulsion of the placenta is as Ahlfeld describes, but has no bearing on the natural process. Kleinwächter's second case recalls the one recorded by Sir James Simpson, where an elongated macerated fœtus was expelled spontaneously through a malacosteon pelvis. (Selected Works, edited by Black, p. 157.)]

Porro's Operation on Account of Cicatricial Narrowing of the Vagina.

Weiss reports (*Arch. für Gynäk.*, Bd. xxviii. Hft. 1) the case of a patient in a normal labor at her twentieth year. Three years after this she had a second child, the labor being as follows: Pains began on the evening of February 12, 1883, the head being in the second position. The membranes soon ruptured, and on the 11th, at 3 A. M., the os uteri was the size of two inches. Little progress was now made, and a medical man was therefore summoned, who applied instruments several times unsuccessfully. A second practitioner was asked to help, and perforation without extraction was performed. Ultimately, late on the 12th, the child was born spontaneously. Perineum was much torn, but not sutured, and parts were greatly swollen. The puerperium was marked by fever, and on the eighth day there were hemorrhage and passage of urine by the vagina. For five weeks this continued, but in about four months the patient could retain her urine, although no operation was had recourse to.

Weiss saw her about the end of her third pregnancy (April, 1884), and found her in bad condition, with severe pains in the back and feverish. The pelvis was simply flat; conjugata diagonalis, four and one-fifth inches (eleven cm.). The perineum was torn to the verge of the anus, but not into it, and was cicatrized, hard, and narrowed to a point about two cm. below the pelvic brim. So far as vaginal examination was concerned, pregnancy could not have been diagnosticated. Labor set in on May 14th, and on May 16th the opening at the top of the vagina was about two inches in diameter. Forceps were now applied, and ultimately a deeply asphyxiated child born, the cicatricial ring tearing in several places.

At her fourth labor the cicatricial condition of the vagina was more marked, and, therefore, the labor dragged on from October 25th till the 28th, when a rigor and threatening of uterine rupture came on. The cicatricial portion admitted merely the tip of the index-finger. Perforation and extraction were out of the question, and, therefore, Porro's operation was evidently best. It was performed in the usual way, an elastic tube being used for the pedicle, as well as silk ligatures for the broad ligaments. The patient recovered, and the child was also alive.

On the Development of Mammary Functions by the Skin of Lying-in Women.

Champneys relates (*Med.-Chir. Tr.*, vol. lxix.) a remarkable series of cases where, in puerperæ, the axillary sebaceous follicles seemed to take on mam-

mary functions. In the axillary skin, Champneys found small lumps varying in size from a pea to an egg, with a nipple or pore from which there could be squeezed granular débris, colostrum, and milk. He believes that the sebaceous follicles in lying-in women are capable of taking on mammary functions, and that this confirms the idea that the mamma is a specialized aggregation of specialized hair follicles. A table of thirty cases is appended, giving details as to dimension, secretion, etc.

THE INTRAUTERINE TRANSMISSIBILITY OF ERYSIPELAS.

LEBEDEFF notes (*Zeitschrift für Geb. und Gynäk.*, Bd. xii. Hft. 2) first the recorded cases of full time or premature children born with evidence of an intrauterine attack of erysipelas derived from the mother. Kaltenbach (*Cent. für Gynäk.*, 44, 884) recorded a case of a fully developed child, which, in the first few days after birth, had separation of the skin, first from the head, neck, and thorax, and afterward from the other parts of the body. This desquamation looked like that of erysipelas or scarlet fever, and was more probably the former, as the mother had twice an attack of bullous erysipelas of the lower extremities in the latest months of pregnancy, and had scaling of the skin at the full time. Kaltenbach believed this to be probably a case of conveyance of erysipelas from the mother to the fœtus *in utero*, although, of course, no microscopic examination of the fœtal skin and placenta, nor cultivation of the erysipelas micrococci, was made.

Runge, of Dorpat, published a similar case, which had occurred five years before in the Berlin Charité.

Lebedeff next records his own case, with an account of the microscopic examination of the skin of the fœtus, discovery of the erysipelatous micrococci in the lymphatics, and a probable theory of their route from mother to fœtus. His patient was admitted, in the seventh month of pregnancy, to the Obstetric Clinic, with the history of slight œdema of the lower extremities and an attack of erysipelas of the lower extremities. She was delivered of a premature, feebly developed child, which died in ten minutes. At first it looked as if the fœtus were macerated, but this, of course, was highly improbable, considering its live birth. On inspection, the skin was divided into a great number of white and red patches, the former being somewhat raised, and the latter caused by capillary injection. The white patches were covered with vernix. The other organs seemed healthy, the liver being as large as one would expect from the development of the fœtus.

To settle the nature of this fœtal condition it was necessary to discover, and if possible cultivate, the pathogenic micrococcus described by Fehleisen. The latter was impossible, as the fœtus had been dead for twenty-four hours when first seen by Lebedeff. He had, therefore, to settle the matter by examination of the skin. Small pieces of skin with both conditions (viz., unaltered and supposed erysipelatous) were excised, hardened, and stained (celloidin process and Löffler's solution).

The following changes were found: In parts, the uppermost layers of the epidermis were wanting, as well as the rete Malpighii, so that the papillæ had no epidermal covering at all. The injected and dilated vessels were so superficial that they were covered merely with a thin layer of cellular tissue. The dermis was infiltrated with lymph cells, but this was not so marked in the

subjacent fatty tissue. The latter tissue contained the erysipelatous micrococci in its lymphatic spaces. No microörganisms were found in the bloodvessels, all this agreeing with Fehleisen's statement. No organisms were found in the placenta, but they were present in the umbilical cord near the amnion. Lebedeff believes that the route of the microörganisms from mother to fœtus was as follows: They were present in the lymphatics of the mother's legs and passed into the internal iliac plexus which anastomoses with the hypogastric lymphatic plexus. The lymphatics of the genitals open into the latter, and thus the micrococci may pass to the lymphatics of the uterus, and ultimately to the placenta. The difficulty of their being unable to pass through the epithelium of the villi Lebedeff gets over by supposing that they entered some of the villi which are not provided with such epithelium (Langhans). They thus reach the umbilical cord and the skin of the fœtus.

On the Relations of the Gonorrhœal Infection to Puerperal Diseases.

Sänger (*Arch. für Gyn.*, Bd. 28, S. 476) found in 1930 gynecological cases examined last year in public and private practice, 230 (12 per cent., or oneeighth of all cases) where the initial cause was gonorrhœa. This diagnosis was based on the existence of a catarrh of the vagina and uterus, with affection of the uterine annexa and connective tissue. In the history there were found either gonorrhœa in the husband, gonorrhœal affections of the children, diseases of the urinary organs, or affections of the Bartholinian glands. In 161 additional cases the diagnosis of gonorrhœa was certain in 22. Sänger thus bases the diagnosis on clinical symptoms, as there is yet, he holds, no special characteristic of the gonococci, and they are wanting in tube affections.

The relations of gonorrhœal infection to pregnancy, labor, and the puerperium are of great importance. Some years ago Sänger found in the Leipzig Clinique 100 cases of purulent discharge in 389 pregnancy cases, and 40 per cent. of the children with gonorrhœal ophthalmia, in spite of the use of injections. Gonorrhœa can cause symptoms in the puerperium like those of septic poisoning. The serious forms of gonorrhœal affections appear late in the puerperium, when the mischief has reached the tubes and peritoneum.

Two cases are given. In the first case (sixth labor) there were at the third week left parametritis and pelvic peritonitic exudations in Douglas's pouch, with high pulse and some rise of temperature. The husband had then a gonorrhœa, and the woman had, besides, the remains of an old gonorrhœal attack of the right uterine appendages. In the second case the patient was infected by her husband on the ninth day of the puerperium, and passed for twenty-two weeks through severe pelvic peritonitis.

Women, therefore, with recent or old inflammatory deposits, and with simultaneous affections of the appendages, have usually been infected with gonorrhœa.

Mesial Section of a Woman Pregnant at Full Time, the Child presenting Breech; with Remarks on the Position and Form-relations of the Gravid Uterus.

This atlas of Waldeyer (Berlin, 1886) fills a great gap in the anatomy of the full-time pregnant uterus, as, until now, obstetricians have never had a section of a cadaver with a full-term uterus, showing the relations of the cer-

vical canal. In addition, the fœtus presented the breech, a presentation never hitherto figured from nature.

The cadaver was that of a multipara, thirty-eight years of age, who had already borne nine children. She was expecting her confinement daily when she was killed by a locomotive passing over the body at the junction of limbs and trunk. The cadaver was frozen by Waldeyer, sawn, and then hardened in alcohol. The first plate shows a sagittal mesial section of the entire cadaver; the second is the same, with the dorsum of the child drawn; in the third the left half of the internal surface of the uterus is given; while, in the fourth, the ventral surface of the fœtus is figured. In plate five, transverse sections of a six months' pregnancy are drawn.

As the result of the accident there was a fracture of the pelvis in the neighborhood of the body of the first sacral vertebra; one of the arches of this vertebra, and one of the upper right pubic ramus, this last projecting into the lower segment of the uterus. The alterations which these conditions cause will be noted afterward. The cavity of the uterus is seen to be oval in shape, but slightly bulbous at its upper end. The placenta is at the fundus. The uterine wall is of almost uniform thickness. Veins are irregularly distributed in the walls, chiefly in the anterior walls and at the placental site.

The most important facts are in relation to the cervix. The anterior and posterior lips of the cervix are broad, and the anterior and posterior fornices vaginæ fairly marked. The cervical canal is intact, 38–39 millimetres (one and a half inches) long, and thus has the same length as the cervical canal of the two months' pregnant uterus figured by Braune in his large atlas. The views of obstetricians as to the behavior of the cervical canal during pregnancy have undergone many variations and contradictions since Matthews Duncan, Taylor, and others asserted that it remained intact until near the end of pregnancy; but this section supports their views in the strongest manner possible, and is a staggering fact for those, who, like Bandl, Küstner, and Bayer, hold that its upper end becomes absorbed into the uterine cavity prior to labor.

An entire microscopic section of the cervix, from os internum to vagina, is given, and the following facts brought out: The cervical glands are enlarged and pass out on the lips of the os uteri (probably from cervical laceration). In the upper third they are smaller and sparser. The epithelium of the canal is defective, probably from post-mortem changes. The upper two-thirds of the cervical canal contain mucus, and the membranes dip in no way into it. The form of the pregnant uterus is further well shown by transverse sections of a six months' pregnancy. The uterine shape is seen to be deformed by the intestinal coils, psoas muscle, and other anatomical structures. The fracture of the pelvis in the full-time breech pregnancy has disturbed the vaginal and urethral axis, and gives the pelvis a slight resemblance to spondylolisthesis. Apart from this, however, the atlas has the highest value to all obstetricians. In addition to its bearing on pregnancy, it has in its spinal, thoracic, and abdominal relations, many points of interest to the pure anatomist.

NOTE ON ONE OF THE CAUSES OF DIFFICULTY IN TURNING, WITH REMARKS ON THE PRACTICE OF AMPUTATING THE PROCIDENT ARM.

Cases have from time to time been recorded in our weekly journals where a practitioner in an impacted cross birth succeeded in turning, only after

amputation of the prolapsed arm. These cases have been always difficult to understand, as the recognized and successful operation in such instances has been to decapitate with Braun's blunt hook.

DR. HERMAN's paper (*Lond. Obst. Tr.*, vol. xxviii.) throws light on these, as he records three instances where he noted in impacted cross-birth that the shoulder of the prolapsed arm was caught beneath the contraction ring and thus prevented rising when version was attempted. Dr. Herman overcame the difficulty by pushing the shoulder toward the centre of the cervical canal and thus releasing the impaction hindering turning.

The Alexander Operation.

ZEISS considers (*Arch. für Gynäk.*, Bd. xxviii. Hft. 3), first, Winckel's objections to this operation as given in his recent "Lehrbuch." Winckel has pointed out that in retroflexion the utero-sacral ligaments are also relaxed, and also that by the operation one displacement was substituted for another.

Zeiss has operated thrice. In his first case the patient aborted at the fourth month, and a hernia had developed on one side. In Case II. the uterus was very movable at the region of the os internum. Operation easy, and result, so far, good. Case III. was a young girl who was unable to wear a pessary. Operation; pain diminished; now wears a ring pessary. Slavjansky had operated by way of trial. Two operations were good; in the third case he did not find the ligaments; in the fourth case operation was difficult, and in the fifth the result was good. Küstner had operated twice, with bad results. Mundé spoke favorably, and Winckel maintained his adverse opinion, alluding to the hernia in one of Zeiss's cases. Results were not yet at hand.

On the Prevention of Gonorrhœal Ophthalmia in the Newborn Child.

KALTENBACH believes (*Arch. für Gynäk.*, Bd. 28, Hft. 3) that the greater number of eye affections in lying-in institutions, as compared with private practice, is due to the more frequent vaginal examinations in the former, and in the carrying of the mischief from case to case during the puerperium. He employed vaginal injections of corrosive sublimate, 1 in 1000, and washing the eyes with distilled water. Great care was taken not to carry infection. In 200 cases so treated, he had one slight catarrh. This method avoids any irritation to the eyes, such as may arise from the use of nitrate of silver. In the discussion, Zweifel said he had tried vaginal douches of carbolic lotion and washing of the eyes of the child with boiled water as a preventive. This succeeded so long as carried out by the medical man, but without this he had an epidemic, and had to return to Credé's plan. Olshausen, Winckel, Leopold, Schatz, Prochownick supported Credé's method.

Credé gave his most recent results, viz., three slight cases in 1211 births. He pointed out that irritation of the eyes could be avoided by using a glass rod fifteen centimetres long, three millimetres thick, with smooth round ends, and thus a small drop obtained. He condemned drop bottles. His method could be carried out by midwives or the laity.

Nineteen Cases of Amputation of the Uterus for Myoma.

Gusserow reports (*Charité Annalen*, 11th yearly issue) nineteen cases in which the uterus was removed by abdominal section at the level of the os internum, and thus the uterine cavity opened. Six of the patients died, a mortality of 31.6 per cent. Corrosive sublimate (1 in 1000) was the principal antiseptic, and carbolic spray was used in the room. The pedicle was usually treated intraperitoneally according to Schröder's method. In one case the extraperitoneal method was tried as the patient had prolapsus uteri, but death resulted. In two cases the bladder was opened into, in one owing to there being a diverticulum into which the male catheter used did not pass. He alludes to Keith's advice, viz., to have the bladder full. In the first case he sutured the wound, but in the second brought the wound into the abdominal incision, thus making an abdomino-vesical fistula. This ultimately closed; of course, a permanent catheter was employed through the urethra. For sutures to the stump and bladder he at first employed silk, but has now more confidence in sublimate catgut, owing to the silk ligatures usually coming away with or without pus. The indications for this operation he considers to be, bleeding, rapid increase, and pain. The removal of the appendage he considers to promise good results, but it is often difficult, and the results not yet sufficiently certain.

The following are some of the more interesting cases:

Case IV. Patient forty-three years of age. The tumor was rounded, projected three finger-breadths above the navel, dipped into the pelvis, and fluctuated at special points. Diagnosis, cystofibroma. The operation was difficult, and as it was impossible to turn the tumor out of the abdominal cavity, it was punctured to lessen its bulk. Blood issued from the punctures, and when the openings so made were stitched, the stitch apertures bled too. The tumor had adhesions to the omentum, bowel, and bladder. Ultimately the tumor was freed, a tube passed round at the top of the vagina, the stump sutured, and along with the edges of the bladder which had been wounded, fixed into the lower angle of the wound. The patient died in five days from septic peritonitis. On post-mortem there were general purulent peritonitis, total atrophy of the right kidney, and hydronephrosis of the left. Yellow atrophy of the heart, and œdema and hypostasis of both lungs were present. The tumor was in part telangiectatic.

Case XI. Patient forty-three years old. The abdomen was distended with a tumor reaching to the umbilicus, and evidently made up of three parts. One projected a hand's breadth above the symphysis, the second lay to the left, and the third to the right. The right tumor projected into Douglas's pouch, and the posterior vaginal wall was prolapsed. A large abdominal incision was made, and the tumor dipping into Douglas's pouch easily lifted out. The annexa, which were very vascular, were easily ligatured and separated, although the left spermatic plexus bled considerably. The vesico-uterine fold of peritoneum was then divided and separated from the anterior surface of the tumor with a good deal of hemorrhage. The tube was then passed round, the tumor removed, and the stump and peritoneum sutured. The patient died in twenty-seven days from septic peritonitis; there was no fever, but sickness, distention of the abdomen, pain, very rapid pulse, icterus.

Drainage was begun on the third day, and the abdominal cavity was washed out with tepid salicylic acid solution. On post-mortem, there were peritonitis, hemorrhagic ulcers in the jejunum, and double pyelonephritis.

Physiological and Therapeutic Effects of Water at Different Temperatures.

In this research (*Edin. Med. Journ.*, August and September, 1886), Dr. Milne Murray gives us exact researches on the action of water, at varying temperatures, on unstriped muscle. The variations in temperature were: Cold (32°–60° F.), intermediate (60°–100° F.), and hot (100°–120° F.). The parts experimented on were the pregnant and non-pregnant uteri of rabbits, and a recording apparatus was employed by means of which the slightest contractions could be shown. The chief points made out were that, apart from any stimulus, there was evidence of constant rhythmic contractions going on in the uterus and vagina of the rabbit. This may go on for hours. The same was found to go on in the vagina of a pregnant primiparous woman. This was ascertained by passing a Barnes's bag into the vagina and connecting it with a manometer. The effect of a single application of water under 50° F. to the horn of the vagina was (a) a latent period of forty to ninety seconds; (b) a contraction taking one to five minutes to reach a maximum; (c) relaxation occupying three to fifteen minutes.

Single applications of water at 50°–60° F. gave much the same results. *Successive applications of cold water rapidly exhausted the excitability of uterine muscle.* This is a most important fact.

The direct application of hot water (over 100° F.) gave as a result: (1) Abolition of latent period; (2) rapid maximal contraction; (3) slow relaxation.

The effect of repeated applications of hot water (110°–115° F.) is to give a lengthening of the relaxation period—*i. e.*, we have almost a condition of tonus, then. The contrast between the effects of cold and hot water may be put thus: "While the initial efficiency of cold and hot water vary as 1 to 2, the efficiency of cold stimuli *diminishes*, in four experiments, from 6 to 1.4 (nearly to one-fifth); while the efficiency of hot stimuli, in the same number of experiments, *increases* from 12 to 48.5 (more than four times)."

The contrast between the two is well shown in the following columns:

Cold water (32°–60° F.).	*Hot water* (110°–120° F.).
(1) Marked latent period.	(1) Latent period absent or very short.
(2) Slow contraction.	(2) Rapid contraction.
(3) Relaxation thrice the duration of contraction.	(3) Relaxation twelve to twenty-four times the duration of contraction.
(4) Loss, in four experiments, four-fifths the initial efficiency.	(4) Gain, in four experiments, four times the initial efficiency.

In regard to the changes in the vessels, Dr. Murray found:

1. Water at 120°–110° F. constricts bloodvessels and arrests hemorrhage from small arteries.

2. Water at 100°–70° or 60° F., dilates small vessels and promotes hemorrhage.

3. Water at 50°–30° F. checks hemorrhage by constricting bloodvessels, but this only temporarily.

One interesting experiment was made on the pregnant uterus of a doe. The uterus was exposed, and a jet of water at 40° F. allowed to play on the one side, while one at 115° F. was directed on the other. This was continued for four minutes. The result was, at first, that both sides became pale; but at the end of the four minutes, the side receiving the hot water was anæmic, while vascularity was beginning on the other side. In four minutes, the cold side was bright red, the hot side still anæmic.

For therapeutics, therefore, hot water bears the palm. Its value in inflammatory conditions has now long been known, chiefly through Emmet's advocacy. Its value is very great in abortion cases. Dr. Murray mentions a case where the cervical canal was the size of a florin, and a hot vaginal douche caused the uterus to expel the entire ovum. For post-partum hemorrhage its rapidity of action and the tonus it induces make it the remedy in this accident. Dr. Murray recommends it, further, in gastric ulcer hemorrhage.

Labor in a Patient with Double Sexual and Urinary Organs.

Engel (*Arch. für Gynäk.*, Bd. 29, Heft 1) first discusses the development of the genitals from Müller's ducts. It is fairly easy to understand the double sexual organs in this case, but the double condition of the urinary organs is puzzling. The woman had also a cleft pelvis (Spaltbecken). The case is described as follows:

A. L., thirty years of age, admitted to hospital April 6, 1885. The nurse's attention was directed to the abnormal condition of the sexual organs, and a careful examination of the case made by Engel. On separation of the limbs a tumor, about the size of a hen's egg, between the labia majora, uncovered by hair, could be seen. Between its lower end and the anus there was mucous membrane, and on each side a vaginal entrance, bounded laterally by the labia majora. The clitoris, with its prepuce, was double; labia minora were present, as well as a double urethral orifice. The right hymen was ruptured but the left was intact. The rectum was dilated so as to admit two fingers. The right vagina was wide; os uteri dilated to the amount of two finger-breadths; membranes intact, and presenting part high. On external examination the child was found to be breech, and the symphysis joint was deficient, the ends of the bone about two centimetres apart, and the space filled up by soft parts (Symphysenspalte.) Ultimately the child was extracted manually and lived. The first stage lasted twenty-nine and a half hours, the second eight hours, the third eighteen minutes.

The unimpregnated uterus was felt, after labor, in the true pelvis and about the size of a two months' pregnancy. By the catheter 120 grammes of urine were removed through the right urethra and 100 grammes through the left. The patient urinated spontaneously through the right urethra, but required the catheter for the left bladder. [One would have expected the reverse of this, as the right uterus was the pregnant one.] It was specially noted that during the labor no further increase of the cleft happened. Thus in this remarkable case of a deficient pubic symphysis and double genital urinary organs, the labor ended normally.

It is also surprising that the patient suffered no inconvenience in walking. Repeated after-examinations of this case showed that the uteri were separate from one another, and that the bladder and urethræ did not communicate. There were only two ovaries. The condition of the genital organs can be partially explained, but not that of the urinary organs. So far as is known, the allantois, from which the bladder develops, is a single organ.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

UNDER THE CHARGE OF

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Signs of Virginity in an Exhumed Body.

Grigoresco, of Ilfov (*Annales d'hygiène publique*, Sér. 3, T. xvi. 1886, pp. 225–239), gives the results of the medico-legal investigation of a case where it was important to determine if a child, aged seven years, and buried for one year, had been violated previous to death. The occasion of the investigation was the death of the child's father from poisoning by sulphide of arsenic (orpiment). His wife, who was suspected of having administered the poison, alleged, on the contrary, that he had committed suicide from remorse at having violated his young daughter a year before her death. The body of the daughter was accordingly exhumed. It was found to contain a large quantity of sulphide of arsenic, so that there was no doubt as to the child also having been poisoned. The mother had stated that her knowledge of the defloration of her daughter was obtained from the confession of the child, and, later, of her husband. She admitted, however, that, although she noticed some spots of blood on the chemise of the child, she did not examine her person; further, the child had not complained of any soreness about the genitals. The medical examination of the exhumed body showed that all the fleshy parts of the body were completely mummified. The lower part of the trunk, containing the genital organs, was macerated for seven hours in a three per cent. solution of potash, when it was transferred to pure water and kept there for two days. By this time, the soft parts were much softened, and began to assume the appearance of a freshly buried corpse. The vulvo-vaginal orifice was now easily recognizable. The parts were next digested for a day or two in a weak solution of acetic acid. All the parts had now become as soft as those of a corpse dead for twenty-four hours. The labia majora and minora were perfect. The anterior commissure of the latter was well preserved, as was also the prepuce of the clitoris. The vestibule of the vulva was preserved in all its integrity, and the urethral opening was easily made out. Below the latter was the vaginal tubercle, of the size of a lentil, and having attached two grayish membranous shreds, three mm. long and two mm. broad, which lost themselves in the circumference of the vaginal orifice. The muscular covering of the vagina

and rectum was completely preserved. On the left labio-vaginal surface, toward the posterior commissure, there was a fragment of grayish membrane, half a mm. in thickness, four mm. broad, and five mm. long. It was attached along one of its borders. The free border was irregular. This membrane appeared to be a portion of the hymen, the remainder of which had been destroyed by putrefaction. The pelvis was now placed in alcohol for three days and again examined. The examination was aided by slight dissection. There was now discovered, near the membrane just described, another finer membrane, three mm. broad, of a ribbon-like form. It passed toward the vaginal tubercle, and was six to seven mm. long. One end was attached to the vulvo-vaginal surface, the other was free. It formed about the half of a crescent, whose concavity looked toward the front of the vulva, and was undoubtedly the left half of the hymen. The membranes were further hardened in alcohol, and examined microscopically. They were found to agree in structure with the hymen. From this investigation it was concluded that the child had not been deflowered a year previous to her death, otherwise there would have been no remains of a membranous hymen; and it was highly improbable that she had been deflowered shortly before death (when membranous fragments of the hymen might have remained), for the reason that defloration must have been accompanied by great injury to the vulva and by copious hemorrhage, and by complaints of great pain, of which the mother gave no evidence. The mother was convicted of a double homicide, and sentenced to penal servitude for life. Four years afterward she confessed that she was guilty of the double crime, and that she had invented the story of her daughter's violation.

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Curara.

S. Pollitzer, of New York, has, under Kühne, of Heidelberg, reinvestigated some points in the action of curara (*Journal of Physiology*, vol. vii. pp. 274–282, 1886). Many years ago Kühne found that the irritability of the sartorius muscle of a frog, poisoned with even the largest doses of curara, was never wholly uniform throughout the length of the muscle, the median portions supplied with nerves having a greater irritability than the nerveless extremities. He concluded, therefore, that curara leaves unaffected certain terminal nerve-elements in the muscle. Sachs was unable to verify Kühne's results, and attributed them to imperfect curarization of the muscle. Pollitzer has repeated Kühne's experiments with the aid of a carefully devised apparatus for applying electrical stimulation to the muscle at different points in its length. He first of all ascertained what variations in irritability exist throughout the length of the normal sartorius of a frog. He found certain variations common to all normal sartorii. These variations he attributes to differences in nerve distribution. He then investigated the effect of curara, and found that, although curara diminishes the irritability of the muscle in its whole length, yet it does not greatly affect the variations observed in the normal muscle. That is to say, certain portions of the muscle still remain more irritable than other parts. If the nerve terminations in the muscles were perfectly and wholly paralyzed by curara, as is usually maintained, then it was to be expected that the linear variations in the irritability of the muscle

would have disappeared, since these were dependent on the nervous supply, and the nervous supply was now eliminated. Reasoning in this manner, Pollitzer concludes that "curara leaves unaffected certain terminal nerve-elements in the muscle," and that "it affects some part of the nerve-fibres between the nerve stems and their ultimate ends in the muscle fibrillæ." He suggests, although he is able to offer no proof of this, that the particular part affected by the drug is the cement substance at the nodes of Ranvier, which becomes so modified that the nervous impulse can no longer pass through it. The paper is one of considerable interest.

CACODYLIC ACID.

J. MARSHALL and W. D. GREEN (*Amer. Chem. Journ.*, vol. viii. 128–138, reported in *Journ. Chem. Soc.*, cclxxxv. p. 730, 1886) have reinvestigated the action of cacodylic acid. Several investigators have stated that the acid, in spite of its containing the element arsenic, has no poisonous properties. Lebahn, however, observed that rabbits died in from one to twenty-five days after injection of quantities of cacodylic acid up to 2.3 grammes. As Lebahn makes no mention of the purity of the acid he employed, it is probable that the results he obtained were due to an admixture of ordinary arsenious acid in the preparation used. Marshall and Green find that commercial cacodylic acid often contains arsenious acid. These investigators administered pure cacodylic acid to dogs in doses of one to three grammes without producing a lethal effect; salivation, vomiting, and purging were the only symptoms observed. Larger doses did not cause death unless in the case of one small dog, which died after the subcutaneous injection of three grammes. The authors believe that the general effects of cacodylic acid are similar to those of arsenious acid, but are more transitory.

THE POISONOUS ACTION OF PEPTONES AND ALBUMINOSES.

S. POLLITZER has, in Kühne's laboratory, investigated the action of peptones and albuminoses on animals (*Journal of Physiology*, vol. vi. pp. 283–290, 1886). The albuminoses were prepared by the method of Kühne and Chittenden, and the peptones by that of Wenz. Similar experiments had formerly been made by Schmidt-Mülheim and others, but the preparations employed were impure. The results of Pollitzer's experiments are the following: All the varieties of albuminoses and peptones employed, except antipeptones, exercise a strong narcotic action on dogs and cats when introduced into the veins, hetero-albuminose being the most powerful of them. In addition to the narcosis which supervenes within two minutes—and is said to resemble that produced by chloroform, although the reflexes are perfectly preserved—there are at first signs of strong intestinal peristaltic action, accompanied by defecation, and generally also by micturition. There is no motor paralysis; but the muscles are thrown into a cataleptic condition. The author denies that the poisonous effects are due to the admixture of a ptomaine, as Brieger has asserted. Most of the substances employed have a remarkable effect in preventing or delaying the coagulation of the blood drawn from the arteries of an animal into whose circulation an injection has been made. They also have a marked effect on the blood-pressure, greatly lowering it.

This is due to the vaso-motor paralysis. The narcosis is coexistent with the lowering of the blood-pressure. The albuminoses are sharply distinguished from the peptones by the fact that a sufficiently large dose of the former (more than 0.3 grm. per kilogrm.) is inevitably fatal, whereas peptones never produce this result so long as the kidneys are intact. The peptones are rapidly excreted.

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The Nature and Action of the Venom of Poisonous Snakes.

R. Norris Wolfenden has undertaken, in the physiological laboratory of University College, London, an investigation of the nature and action of the venom of poisonous snakes, the results of the first part of which have been recently published in the *Journal of Physiology*, vol. vii. 327–364. So far he has investigated the venom of the Indian cobra (naja tripudians) and of the Indian viper (daboia russellii). As to the nature of the poison of the cobra, the author concludes, from a number of careful experiments, and after a critical examination of the investigations of previous observers, that "the toxic power of cobra venom resides in the proteid constituents of the secretion, and is lost when the proteids are removed and diminished as these are diminished." It is not of the nature of a germ, nor is it alkaloidal. Blyth's cobric acid, he believes, has no real existence. An attempt was made to separate and distinguish the proteid constituents of the venom; and globulin, serum albumen, and syntonin were obtained, with an occasional trace of peptone. The supposed action of permanganate of potash as an antidote to cobra poisoning is due merely to its usual action on the proteids, which it oxidizes and destroys. This, however, it cannot effect after the poison has been absorbed. A few experiments were made on rats, in order to observe the action of the cobra venom and of some of its constituents. The usual symptoms were observed: drowsiness, with progressive paralysis of the muscles of locomotion, followed by paralysis of the larynx and tongue, salivation and vomiting, increased secretions, slow and labored respirations, convulsions and asphyxiation, the heart continuing to beat long after apparent death. Consciousness remained to the end.

The examination of the venom of the Indian viper was not so complete, but enough was done to lead to the conclusion that its toxic properties are resident in its proteid constituents. As in the case of the cobra venom, the author was able to separate various proteids. These were similar in chemical character to those obtained from cobra venom, except that albuminose took the place of syntonin. The author believes that the investigations of Pollitzer (a summary of which will be found above), and others, of the action of ordinary peptones and albuminoses, point to the probability of the proteid constituents of the venom being likewise the poisonous constituents.

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Cobric Acid.

In 1876, Wynter Blyth published, in *The Analyst*, an account of an acid (cobric acid) which he had separated in small quantity, and in crystalline form, from the cobra venom, and which he believed to be the poisonous constituent of the venom. Wolfenden (*Journal of Physiology*, 1886, vol. vii. pp. 365–370) has repeated, apparently with great care, the process by which

Blyth obtained the acid, but with entirely negative results. He finds, however, that the crystals described and figured by Blyth bear a striking resemblance to those of sulphate of lime. For this and other reasons, he concludes that the crystals of so-called cobric acid are really sulphate of lime.

ERGOT.

It is rare that, in cases of ergot poisoning coming under the cognizance of criminal authorities, the chief symptoms take the form of gangrene. Such a case was recently reported to the Société de Médecine Légale de France, by M. POUCHET (*Annales d'hyg. publ.*, sér. 3. xvi. pp. 253–270, 1886). It was that of a young woman, a domestic servant, who, after having aborted on several occasions, died suffering from gangrene of the extremities, the gangrene having appeared about a month before death. There was strong suspicion of her death having been caused by ergot; and on investigation it was found that, while in the employment of a farmer, she had become pregnant on several occasions. On the first three of these, her master had administered to her an inodorous, bitter, grayish-white liquid, which soon caused violent colic and pain in the loins with a feeling of extreme lassitude, followed a few days afterward by menorrhagia and abortion. On the fourth and fifth occasion she stoutly refused to take the draught which was prepared for her, and her pregnancies terminated naturally in the birth of two children. On two subsequent occasions she was again pregnant, but consented to take the draught, which was several times repeated, and, as a result, she aborted. Finally, on the 6th of March, 1885, she had still another abortion, brought about as before by taking the mixture prepared by her master. A month afterward she was visited by a doctor, and found to be pale, cyanotic, and œdematous; tongue furred; breath fetid; pulse feeble and irregular; great dyspnœa with mucous non-sanguinolent expectoration; dulness and crepitations at the apex of the right lung; considerable hypertrophy of the heart, with bruit accompanying the first sound. The doctor ascribed these symptoms to the condition of the heart. Three months later, about the middle of July, and a month before her death, gangrene appeared in both hands, the right forearm, and both feet. There was now a condition of extreme cachexia. At her death (August 14th) the gangrene had advanced considerably. After the autopsy an analysis was made of several parts of the body (uterus, stomach, liver, kidneys, heart, brain, etc.) in order to ascertain whether ergot was discoverable. By means of petroleum ether a coloring matter was separated which presented a spectrum absolutely identical with that of ergot, and an extract was prepared which, M. Pouchet says, exhibited all the reactions of ergotinine. A dog poisoned with ergot, and afterward examined, yielded chemical results similar to those met with in the case of the woman. Pouchet, therefore, concluded that the woman had died o ergot poisoning, and that the ergot had been administered over a great length of time, probably several years, though intermittently, as the history of the case showed. Her master was condemned to ten years' imprisonment.

ACTION OF LIME, POTASSIUM, AND OTHER SALTS ON MUSCULAR TISSUE.

PROF. SYDNEY RINGER, of London, gives the results of further investigation of this subject (*Journal of Physiology*, 1886, vol. vii. pp. 291–908). In

experiments on the heart, he states that he now employs phosphate of lime, instead of chloride of calcium, in the composition of the artificial circulating fluid. With such a fluid the contractility of the frog's heart can be preserved for several hours. It also preserves the contractility of skeletal muscles for a long time. It preserves contractility fully one and a half times as long as the usual 0.6 per cent. saline solution. The addition of bicarbonate of soda to the ordinary saline solution increases its power; but it is still less effective than phosphate of lime. The addition of chloride of potassium to the saline solution containing phosphate of lime still further increases its power of preserving muscular contractility. From such results as these, the author argues "that lime and potash salts are as necessary to the metabolism of muscle at rest as to the metabolism occurring during a muscular contraction." He also gives experiments to show that salts in part preserve contractility by preventing or lessening twitching of the muscles.

Hypochlorite and Hyposulphite of Calcium.

Prof. Poincaré, of Nancy (*Annal. d'hyg. publ.*, sér. 3, tome xvi. pp. 153–155, 1886), states, as the result of several experiments on some of the lower mammals, that the gases which escape from dry hypochlorite of calcium or from hyposulphite of calcium have no bad effects on animals. The experiments were made by keeping the animals, for more than a month, in cages containing saucerfuls of the substances. A little acid was from time to time added to the hyposulphite.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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Milk Infection.

In the last number an account was given of a disease occurring in cows on a farm at Hendon, Middlesex, which was believed to have given origin to infection with scarlet fever of the drinkers of milk from these cows. The official report by Mr. W. H. Power, Medical Inspector of the Local Government Board of England, is now published, and the evidence which he adduces therein may be held to be sufficient to warrant the conclusion that the cow-disease caused scarlet fever in man. The farm, which consisted of three sheds—a "large," "middle," and "small" shed, beside quarantine sheds—was found to have had special pains taken to render it, as the phrase is, "sanitarily perfect," and had for several years been the subject of special supervision by the Medical Officer of Health of the district, who had also undertaken to observe and report to the London milk retailers any occurrences of infectious disease in the neighborhood of the farm. Milk from the

farm was distributed in four different districts of London and in the district of Hendon, Middlesex, and it was early ascertained that if the milk had caused scarlet fever amongst its consumers, it had not acquired the ability to do so in any commonly accepted way, such as through unwholesome conditions of water or drainage, or through careless handling of milk or milk utensils by persons carrying scarlet fever infection. Nor during the long subsequent acquaintance with the farm gained in the course of this inquiry did any reason appear for modifying this conclusion. Inquiry elicited the following facts: Scarlet fever attacked the consumers in two London districts—South Marylebone and Hampstead—at the end of November, or the early part of December of 1885, the latter district being again attacked in mid-December; a third London district—St. Pancras—was attacked early in December and mid-December; the consumers in the fourth London district—St. John's Wood—escaped up to the date of the inquiry; while the Hendon consumers were attacked in early December.

London district, South Marylebone, received all the milk from the large shed, and when this was insufficient it was made up with the milk from the middle shed, which also supplied districts Hampstead and St. Pancras, and when the supply was insufficient was supplemented with milk from the small shed; the rest of the milk from the last shed went to district St. John's Wood. The milk from cows in the quarantine shed was distributed to the first three London districts.

Three newly calved cows were received from Derbyshire on November 15, and after being in the quarantine shed for a few days, were transferred to the general sheds. Four other cows from Oxfordshire followed them on December 4, first into the quarantine shed, and then transferred to the general sheds. It was seen that the arrival from Derbyshire of the newly calved cows did, in fact, shortly precede the first occurrence of scarlatina in four milk districts, namely, at the end of November or beginning of December; so that the cause of the scarlatina (whatever it was) was actually manifested in these four districts just after the time when the milk of these cows came to be included in the produce of the farm.

The date of the appearance of scarlatina in the different districts coincided with the subsequent distribution of the newly arrived cows. Thus, the 15th of November cows had been toward the end of that month transferred to the "large" shed, and their milk had been delivered from thence. The four 4th of December cows had been transferred about December 11—two of them into the "large" shed and two into the "middle" shed. As already stated, scarlatina began at the same time to appear among consumers of milk from these sheds, and during this time the drinkers of milk from the other sheds remained exempt. Later it was ascertained that the November 15 and December 4 cows were the first to be attacked with the vesicular disease previously described, and scarlatina continued among the drinkers of their milk throughout. But it was observed that there was temporary diminution, if not a cessation, of fresh attacks among the drinkers of milk from the "middle" shed about Christmas, and this corresponded with the removal of two of the December 4 cows from the middle shed to the large shed. Later, scarlatina appeared among these persons, this fact corresponding in point of time with the appearance of the vesicular disease among the other cows of the middle shed

doubtless contracted from the two December 4 cows which had been transferred. Finally, at the close of the inquiry the drinkers of milk at St. John's Wood, who received their milk from the small shed, began to be attacked, and then it was found that the cow disease had extended to the animals in that shed. Other evidence was forthcoming which need not here be stated, but it tended to confirm the conclusions at which Mr. Power had arrived.

The further investigation of the relations between the cow and human malady then passed into the hands of Dr. Klein, who took for experimental purposes samples of milk, contents of vesicles, and discharges from ulcers of two affected cows, and afterward two other affected cows were purchased and conveyed to him at the Brown Institution, in London. The following is a brief outline of his work. Dr. Klein inoculated several calves with the matter taken from the sores of an affected cow; with a general result that, after an incubation of about three days, the places of inoculation became swollen, tender, and spreading; on the fifth or sixth day the change was distinct, the successful places having become sores, the marginal part showing vesiculation, and in the centre formation of crusts. In slight cases the healing began about the ninth or tenth day, in severe cases not before the end of the second week. Microscopic examination revealed a number of red blood-disks mixed with a large number of pus-cells, each of which contained two, three, or four small nuclei and remnants of epithelial cells. Among the pus-cells numerous dumb-bells of micrococci (or diplococci), and a few short chains of the same were met with; in size these microörganisms did not differ from those described in connection with foot and mouth disease. From the deeper parts of an ulcer material was obtained with which tubes containing either solid nutritive gelatine or agar-agar mixture were inoculated; after some days, and in both media, a micrococcus appeared, the growth of which was extremely characteristic. The general aspect of the growth is very similar to that presented by the streptococcus of foot and mouth disease, but the latter, when grown in milk, does not affect the fluid character of the milk, whereas milk inoculated with the organism obtained from the cow's ulcer will, if kept for two days in the incubator, at 35° C., have been turned completely solid.

To learn whether the milk, while in the udder, contained the streptococci, one teat, free from any ulcer, but of a cow having several ulcers on other teats, was milked, and from this milk a large number of gelatine and agar-agar tubes were inoculated. A second teat of the same cow, affected by an extensive ulcer, was milked to the same extent, and from the milk thus obtained a large number of other gelatine and agar-agar tubes were inoculated. In the first series no single tube showed the growth of the streptococcus; whereas, in the second series, one gelatine tube and one agar-agar tube were found to develop the streptococcus. With a cultivation (a third subculture) two calves were inoculated on February 1st; on February 27th one calf was dead. There was effusion at and around the seat of inoculation, and the neighboring glands were swollen and red; there were peritonitis with sanguineous exudation, congestion, and hemorrhagic spots in omentum and serous coat of stomach; the spleen appeared small; the liver greatly congested; the kidneys very large and much congested; the ileum much congested, and its mucous membrane and the epithelium detached in flakes, the mesenteric glands belonging to the ileum enlarged and hyperæmic; both lungs congested, bronchial glands

enlarged and congested; organs of throat congested; and there was pericarditis. The other calf showed, on March 7th, around the nostrils, lips, and on hard palate and gums, numerous irregularly outlined, brownish patches. This animal was killed on March 8th, and the post-mortem appearances much resembled those found in the calf previously examined.

Dr. Klein notes that the changes in the kidneys are highly interesting, since they completely coincide with those in acute scarlatinal nephritis in man. Cultivations were made with blood taken from the heart, and a growth of the streptococcus was obtained, in all respects identical with the streptococcus that had been employed for inoculation of the animals. Dr. Klein says, in conclusion, that he considers it completely established that this streptococcus is identical with the virus of the cow disease.

DISPOSAL OF REFUSE.

The solution of the difficult problem of disposing of the excremental refuse of communities is being attempted in different ways. In London, where the water-carriage system is carried out, an effort is being made to precipitate the sewage by chemical means, and to discharge the effluent into the river, contrary to the advice of the recent Royal Commission on Metropolitan Sewage Disposal. Some portion of the solid matters is to be precipitated with sulphate of iron and lime; after settling for an hour or two, the effluent is to be thrown into the river, but it is expected that in hot weather something more will be necessary to insure complete immunity from offensive effluvia arising from secondary fermentation, and it is, therefore, decided to treat the effluent with permanganic acid (a mixture of manganate of soda and sulphuric acid) before sending it into the river. The sludge, it is anticipated, cannot be disposed of in the vicinity of the outfalls; it is, therefore, proposed to provide steamers of suitable construction to carry it out to sea.

MR. CONDER has proposed to the town of Guildford that the sewage should be treated with certain purifying agents, of which a principal one is sulphate of iron. He suggests that a wire-work cage containing this material should be placed in the sewer and immersed to the extent of about an inch and a half in the sewage, the sulphate being thus dissolved in the sewage (*Lancet*, Sept. 4, 1886). Another mode has been proposed by DR. LOWNDES, of H. M. Indian Medical Service, in a pamphlet entitled "Antiseptic Drainage and the Utilization of the Whole of the Products of Excreta." He objects to cesspools, river carriage, and sewage farms, and proposes to separate solid excreta, urine, and domestic slop waters: the solids being mixed with charcoal and used as manure; the liquids being stored in tanks in which the surface of the fluid is kept covered with a layer of oil and some antiseptic, and these tanks emptied every month and conveyed to central stations. The kitchen slops, he suggests, should be subjected to a process by which the water would flow into the sewers with the rain-water, but the scum of grease would remain in a species of trap, which would be emptied only at intervals. *The Lancet* states that probably this system would be found impracticable in tenement houses, where the want of space for the tanks and the ignorance of the inhabitants would entirely prevent the scheme being carried out; besides this, the retention of solid and liquid excreta in the midst of a populous town would be most prejudicial to the health of the people.

A Belgian Commission, appointed to decide upon the question of disposal of excrement in towns where sewers are impossible, decided as follows: The use of cesspits is inadmissible. The separation system is useless. That of disinfection is costly, and often destroys matter which might be utilized. The process of deodorization is not applicable to all places; in hospitals, barracks, or camps it would give good results, but not everywhere. Fixed and movable receptacles are admissible for want of anything better; the arrangements for emptying them, however, should be in the hands of the local authority. But the disposal of waste water is difficult to manage with cesspools, and, therefore, the best system would be that which would consist in carrying away by means of pumps all excremental matter, and depositing it, according to its value, in one or more central reservoirs. The systems of Bertier and Liernur approach most nearly to this ideal, and it is probable that before long science and experience will find some means of solving this difficulty (*Journal d'Hygiène*, vol. xi. No. 521, p. 466).

Sewage farms have, in some localities, found great favor. It is true the inhabitants of Norwood, near London, have complained that the neighborhood was being rendered unhealthy by the sewage farm; but at Nottingham they have lately selected sewage farming as the safest means of disposing of their refuse, and a paper on this subject was read by Mr. TARBOTTON, engineer to the Corporation of Nottingham, at the meeting of the Municipal and Sanitary Engineers' Association, in July. Mr. Tarbotton arranged that all the valley sewage should be sent by gravitation from the borough to a tract of land secured by the Corporation, about five miles outside the town. There is to be accommodation for about a hundred cows, for forty horses, and for pigs, which consume much of the vegetables produced on the farm. The only objection to the scheme seems to be that there is no prospect of the sewage yielding an income sufficient to repay the large outlay made in the beginning, but that seems to be the case everywhere. An account is given (*Vierteljahrsschrift öff Gesundheitspfl.*, Bd. 18, No. 2, S. 255) of the sewage farms round Berlin; there the amount received from the sale of the products falls far short of the expenses. The chemical examination of the effluent was made by Dr. Salkowski, and that from the meadows appeared to be always clear, colorless, and without odor; the water draining beds being also of the same character, except that now and then a faint earthy smell was perceptible. As regards the health of the inhabitants in the neighborhood of these farms, it appeared to be excellent, the mortality per thousand not reaching to half as high as in Berlin itself. Out of fifteen children who died, but one suffered from an infectious disease; while none of the adult population were attacked by any disease which could be in any way attributed to the sewage farm.

TYROTOXICON: ITS PRESENCE IN POISONOUS ICE-CREAM, ITS DEVELOPMENT IN MILK.

DR. VICTOR C. VAUGHAN, Professor of Physiological Chemistry at Michigan University, referring to his discovery in cheese of a highly poisonous ptomaine, relates in *The Practitioner* (September, 1886) further discoveries of the same ptomaine in milk which has been kept. Last November he succeeded in isolating this poison from milk which had been kept in bottles

tightly closed with glass stoppers for three months. The method of testing for the ptomaine was as follows:

The coagulated milk was filtered through filter paper, the filtrate was found to be acid, and was then rendered slightly alkaline by the addition of potassium hydrate, and agitated with ether. After separation the ethereal layer was removed, allowed to run through filter paper to remove a flocculent white substance which floated in it, and then allowed to evaporate. If necessary, the residue was then dissolved in water, and again extracted with ether. The tyrotoxicon was recognized by its crystalline appearance, by its odor, and by placing a bit on the tongue. Ten drops of a concentrated aqueous solution of the poison were given to a young dog, which retched, vomited a frothy fluid, suffered from muscular spasm over the abdomen, and passed watery stools. The next day it seemed to have recovered, but could not retain food for several days.

In June, of this year, Dr. Vaughan examined some ice-cream which had affected eighteen persons. He found that the vanilla used for flavoring did not contain the poison, and then commenced to test the cream itself. The aqueous solution was then given to a young cat, which suffered in a manner similar to the dog. Dr. Vaughan received information from the doctor in attendance on the persons who were attacked, that their symptoms resembled those of the dog and cat; vomiting commenced about two hours after eating the cream, followed by purging, severe occipital headache, and pains all over the body, especially in the extremities. The throats of all were œdematous, one or two were stupefied, and some lost consciousness for a moment or two. An interesting point in connection with this outbreak was that some of the same cream as that which poisoned these persons was used to make lemon cream, but this produced no untoward symptom. It was subsequently ascertained that the lemon cream was frozen first, and Dr. Vaughan considers that this early freezing prevented fermentation, which proceeded in the vanilla cream, giving origin to the poison. Concerning the chemical composition of this ptomaine, Dr. Vaughan points out that he always found more or less butyric acid in the cheese, milk, and cream in which he found the poison, and he thinks that it may be there is some intimate relation between butyric acid fermentation and the production of the poison. He refers to Selmi's discovery of a ptomaine which resembles coniine, which can be formed by the action of a ptomaine on ammonia. Tyrotoxicon is not known to resemble coniine, but other fatty acids may react with decomposing nitrogenous substances, forming alkaloids.

MUSHROOM POISONING.

DR. HANDFORD, physician to the Nottingham Hospital, gives an account (*Sanitary Record*, September, 1886) of poisoning by mushrooms. After referring to the close resemblance of edible to poisonous fungi, and specially noting that agaricus (amanita) muscarious, which is virulently poisonous, can with difficulty be distinguished from agaricus (amanita) rubescens, he gives the history of a case of poisoning from eating agaricus (amanita) phalloides. A man gathered some of this fungus and ate it in the evening, giving part of one to his child, the next morning he experienced a sense of constriction at the chest, but went to his work as usual. While there, he was seized with

vomiting, purging, and profuse sweating; he was admitted into the hospital, and the following morning Dr. Handford saw him. He still continued vomiting and purging; he had severe pain in the abdomen; the sweating had ceased, and the pupils were normal; he had suppression of urine, the heart's action was regular, but feeble, and the pulse could scarcely be felt. He was given small doses of atropine subcutaneously, but the benefit was slight, and the man died sixty-eight hours after eating the mushrooms. The death was due, it was gathered from post-mortem appearance, to the action of muscarin on the heart and vascular system. The child died twenty-nine hours after eating a portion of *one* mushroom; she suffered chiefly from vomiting and depression. The man had drunk no water, and this probably accounted for the late onset of the disease, the muscarin being only gradually formed as the fluids of the stomach penetrated the mushrooms. In conclusion, Dr. Handford observes that the antagonism of atropine to muscarine does not appear to be sufficiently accurately determined to enable the one to be given with much success as an antidote to the other.

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Industrial Diseases.

Amongst the numerous trades that are injurious to health may be mentioned the manufacture of needles and pins. M. Léon Poincarè, of Nancy, has stated in his *Traité d'hygiène Industrielle*, and to which reference is made in the *Journal d'Hygiène*, vol. xi. No. 518, p. 362, that the most injurious part of the manufacture consists in the "pointing," which must be done when dry, to prevent rust. This operation produces so fine a dust that the workmen engaged in this duty die of pneumonia or phthisis at the end of ten or fifteen years; and he recommends the use of machines in which the grindstones would be replaced by steel drums scratched on the surface and under which could be introduced a flat surface of steel with the needles. Thorough ventilation is also recommended and constant variation of work.

Another disease, which proved to be very fatal, occurred in a paper manufactory, at Ligat, in the Baltic Provinces. In the rag-sorting room, 56 women were employed in April, 1886: 12 cases occurred, 5 proved fatal, one of them within twenty-four hours from the commencement of the attack. The symptoms were similar in all the cases; the disease began with a rigor, in some cases the temperature rising rapidly, but not in others; great depression and headache followed, and all with frequency of respiration, cough, thready pulse, and then a fall of temperature. There was no delirium, but the person attacked sank, collapsed, generally in less than three days. Rapid decomposition set in, commencing on the chest and neck, the bronchial glands were much swollen, sanguineous serum was found in large quantities in the pleural cavities and pericardium. A committee, consisting of Drs. Schultz, Heerwagen, and Kranhals, investigated the outbreak and came to the conclusion that it was "rag-sorter's" disease, and they secured portions of the bodies and specimens of the serous fluids for further research. Bacilli were found, some of them resembling Koch's "malignant œdema bacilli," and a small dog into which some fluid was injected died on the third day with symptoms of malignant œdema.

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TO READERS AND CORRESPONDENTS.

ALL communications intended for insertion in the Original Department of this Journal are only received with the distinct understanding that they are sent for publication to this Journal alone. Gentlemen favoring us with their communications are considered to be bound in honor to a strict observance of this understanding.

Contributors who wish their articles to appear in the next number are requested to forward them before the 15th of November to the Editor, No. 1004 WALNUT STREET, PHILADELPHIA,

Liberal compensation is made for articles used. Extra copies, in pamphlet form with cover, will be furnished to authors in lieu of compensation, *provided the request for them be written on the manuscript.*

The following works have been received for review :

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OTOLOGY.

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THE MONTHLY ISSUE

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES.

With the coming of 1888 THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES will be published at the beginning of every month, instead of quarterly, as heretofore. This change, though simply told, is one of deep significance. To readers it means a trebled frequency of communication with the leading thinkers, workers, and discoverers among their colleagues; to contributors it means a threefold more rapid and a far wider dissemination of their thought; to THE JOURNAL it assures an ever broadening circle of influence; and lastly, to those engaged in the executive work it implies a vastly increased amount of labor. Such a change, however, is simply in accordance with the spirit of the age. Never before were so many earnest workers engaged in all the fields of medical research, nor at any previous time have well-merited honors so surely crowned unselfish labor in behalf of humanity. One potent cause of this state of things may be seen in the enormous mental stimulus afforded by the modern possibility of reducing medicine to an exact science by coördinating and tracing the causation and effect of hitherto isolated empirical facts, through the employment of instruments of precision. These immense strides have now become such matters of fact that it is hard to realize that they are all comprehended within the life of this Journal. Yet we have it from the pen of an eminent medical bibliographer that "from this file alone, were all other productions of the press for the last fifty years destroyed, it would be possible to reproduce the great majority of the real contributions of the world to medical science during that period." Such a record, though legitimately a subject for pride, is here only referred to as a pledge that THE JOURNAL, though crowned with honorable years and achievements, will enter upon

the development of its new and enlarged possibilities with the vigor of youth and the mature experience gained through two generations.

In the adoption of a monthly form certain changes are implied. Though the aggregate of space will be somewhat greater, and though a larger proportion will be devoted to Original Articles, it will be presented in smaller divisions, and therefore brevity will become a virtue ranking second solely to merit. It is but fair that every reader should find in each number something of interest to himself, and if necessary, lengthy articles of value may be divided among successive issues in order to attain this end. Of the remaining two departments that of Progress will undergo no change. It has proved itself of great value, and no advisable alteration has suggested itself after diligent consideration. To accommodate the increased amount of space allotted to Original Communications, the Reviews will be condensed, yet with the maintenance of that judicial spirit which has always looked alone to the interest of the profession.

In its new form THE JOURNAL will become more than ever the favorite medium for presenting articles requiring some elaboration, and in connection with the weekly MEDICAL NEWS, it will furnish all practitioners and specialists with a complete and well-digested knowledge of the real life of the science. Such is the confidence of the managers of THE JOURNAL that their enterprise will be appreciated, that they have decided to accompany the new departure with a notable reduction in the rate of subscription, details regarding which will be found in the advertising pages preceding this announcement.

CONTUSION OF THE ABDOMEN, WITH RUPTURE OF THE INTESTINE.

BEING THE ESSENTIAL PART OF AN ESSAY AWARDED THE CARTWRIGHT PRIZE OF THE ALUMNI ASSOCIATION OF THE COLLEGE OF PHYSICIANS AND SURGEONS, OF NEW YORK.[1]

By B. Farquhar Curtis, M.D.,

ASSISTANT SURGEON TO THE NEW YORK CANCER HOSPITAL.

THE operative treatment of traumatic peritonitis, and of the injuries which cause it, is a matter of such universal interest at present that these pages need no apology. By a series of 44 experiments upon dogs, the general subject of contusion of the abdomen with rupture of the intestine has been studied. By experiments upon the cadaver it has been sought to throw some light upon the still doubtful mechanics of rupture of the gut. An analysis of 116 cases of rupture of the intestine, and of 33 cases of contusion of the abdomen terminating in recovery, has been made, with especial attention to the symptoms of the first hours after the injury, in the hope of rendering an early diagnosis possible. Finally, an attempt has been made, in the light of the experimental and clinical experience thus far gained, to indicate the most promising methods of treatment.

I. Experiments upon Dogs.

The experiments on dogs were conducted upon the following plan:[2] The animals were put under the influence of ether, laid upon the back

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[1] The original essay, containing a full account of all the experiments, and tables, with an analysis of the cases, and references to their source, has been deposited in the library of the New York Academy of Medicine.

[2] The experiments were performed at the Carnegie Laboratory in New York, and the author is indebted to Dr. G. B. Phelps and Dr. F. A. Manning for most valuable assistance in the operations.

on the floor, and a weight dropped upon the abdomen. The weights varied from six to twenty-one pounds; and the height of the fall from four to seven feet. The striking surfaces employed were as follows:

Surface A. The side of a cylinder fifteen inches long, and one and a half inches in diameter, the cylinder being dropped in a horizontal position, its long axis crossing the animal's spine at right angles.

Surface B. A convex, circular surface, about two and a half inches in diameter, the greatest height of the convexity being about half an inch. For most of these experiments, a common porcelain door-knob formed the striking surface.

Surface C. A rectangular piece of wood, five by two inches, the edges rounded off, leaving a flat surface in the middle, three by one inches. This was also dropped with its long axis crossing the spine at right angles.

After the blow had been inflicted, three courses were pursued. 1. The animal was allowed to recover from the ether and left to its fate. 2. Laparotomy was performed after an interval of twenty-four hours; or of only five hours. 3. Laparotomy was done at once—the most usual course.

The immediate symptoms produced by the blow were trifling. Shock appeared in about one-half the cases, but it was usually slight. It was present in three of the cases in which no injury was sustained, and was severe in one of these, so that it was no indication of the severity of the injury received. When severe, it was generally a sign of great hemorrhage, or was due to the fact that the animal was not entirely under the influence of the ether.

In ten cases no injury was produced—in three of these nothing further was done, the intention being to wait for symptoms; in the others laparotomy was performed at once for exploration.

In the dog the cæcum lies by the side of the last part of the ileum, deriving its blood supply from a branch of the mesenteric artery which runs in the cellular tissue between the two. In two cases the cæcum was separated from this attachment to the ileum, rupturing the branches of this vessel, the main trunk being left attached to the small intestine. This artery was of such large size that in one of these cases four ounces of blood were lost from it in the few minutes elapsing before the belly was opened. In both cases gangrene of the cæcum was inevitable, and that part was resected, both animals recovering.

Laceration of the mesentery, so severe as to deprive part of the intestine of its blood supply, occurred in thirteen cases, and was treated by immediate laparotomy, except in one case which died of hemorrhage half an hour after the injury. Four others died on the table of hemorrhage. An artificial anus was made three times and the intestine resected five times—but all died within twelve hours of hemorrhage and

shock, except one of the resection cases, which lived for forty-eight hours, dying of peritonitis from silk which was not aseptic. The unfortunate results of the cases of artificial anus led to frequent attempts at resection, although the animal was too feeble to warrant it, and death was caused by the shock and exhaustion due to the prolonged operation.

In addition to these cases of laceration of the mesentery necessitating resection, there was one case in which a large branch of the mesenteric artery was injured, with such a profuse hemorrhage that life was endangered. The vessel was secured by ligature, the collateral circulation of the corresponding part of the gut found sufficient, and the animal made a good recovery.

Contusion of the intestine severe enough to require treatment occurred in ten cases, including those cases in which the ecchymosis was so extensive as to threaten perforation of the gut, most of them being also accompanied by a laceration of some of the coats of the intestine. The usual form of this last injury was a small fissure in the peritoneal and muscular coats exposing the fibrous coat. It must be remembered that in the dog the submucous coat of the intestine is developed into a strong fibrous tissue resembling a thin aponeurosis, making the wall of the gut very much stronger than in man. Even if the fissure was small, the edges were so bruised and ragged that the fibrous coat, although itself uninjured, was deprived of all blood supply, except the minute vessels which lay in its own tissue, between it and the mucous membrane, or in the tissue of the latter. In injuries of this kind the mucous membrane was found entirely destroyed by the blow, or separated from the underlying fibrous coat by effusion of blood, so that there was no possibility of its capillaries supplying the latter with blood even if they are normally equal to the task—which seems doubtful.

In four cases the injured point was turned into the lumen of the gut and sutured, and three of these recovered, the fourth dying of intestinal obstruction, caused by a Z-shaped bend in the gut at the point of suture, held by firm adhesions. Six cases were treated by resection, of which two recovered. The others died—one of shock, two by yielding of the sutures at the point of resection, and one of peritonitis caused by silk which was not aseptic. Thus we have in this set of cases a total of five recoveries and five deaths.

One of the later experiments illustrated the necessity for these precautions in a very striking way.

In this case (a dog which had been already subjected to a resection experiment) the weight was dropped and laparotomy was performed five hours later. The intestine was found ruptured entirely across at a point in the duodenum, and a loop which had been adherent to the inner surface of the former abdominal wound had been forcibly separated from its adhesions, thus tearing off its peritoneal and the greater part of its muscular coat for a space of about one inch square, but not laying the fibrous coat entirely bare. The dog was

so feeble by the time that the ruptured point had been sutured, that it was determined to leave this doubtful place to nature—the rather because there had been no contusion at this point, the injury having been caused by a dragging and stripping off of the superficial parts, and there seemed good reason to suppose that the mucous membrane was intact, and that its vessels would suffice to supply the fibrous coat with blood. The dog died of shock about eight hours after the operation, and we found that the doubtful spot was black and completely gangrenous.

Rupture of the intestine was produced in eight cases, in two of which there were two ruptures. Of these ten ruptures of the gut, four extended completely across it, and two almost across. Of the rest, three were directed in the long axis of the gut, while only one was transverse—all four being situated on the free border. One of the two cases which extended almost across the gut involved all but the attached border, the other all but the free border—the latter a very rare form of the injury.

The mucous membrane was generally everted, but not in all cases—depending upon the amount of contusion which the edges of the opening had suffered. In some cases, in which laparotomy was done at once, the edges were found much less everted at first than they subsequently became, for the muscular contraction which causes the eversion occurs slowly, and the muscular tissue may have been partially paralyzed by the blow. This gives another proof of how little eversion of the mucous membrane is to be depended upon to prevent fecal extravasation. In the complete ruptures the ends were partly closed by muscular contraction. The same contraction caused wide gaping of the ruptures which were directed in the long axis of the gut.

Rupture of the intestine was treated in one case by resection with suture of the gut five hours after the injury. The dog died of shock and beginning septicæmia and peritonitis, within twelve hours. It was treated by immediate laparotomy in four cases. One of these died from hemorrhage within one hour after the injury, there being a laceration of the mesentery also. Two were too severely injured to permit resection and suture, and an artificial anus was made. One of these died of shock; the other recovered from the operation but succumbed to purulent peritonitis starting from the abdominal wound. The remaining case had a rupture which admitted of suture, as it did not extend entirely across the gut, and recovered.

The most troublesome part of suture of the intestine in resection is the introduction of the stitches at the mesenteric border, on account of the difficulty of bringing the serous surfaces in contact at this point. The triangular interval between the two layers of the mesentery at its attachment to the gut cannot be much reduced by the lateral pressure of two Lembert sutures, placed one on each side of the mesentery in the usual way. A small raw surface, the cut edge of the mesentery, will always remain, communicating at one end with the interior of the gut,

and at the other with the peritoneal cavity. It occurred to me that if the mesentery could be folded down upon the outside of the intestine, and then turned in with the latter at the point of suture, this raw surface would be reduced to a minimum.

To secure this by sutures, they should be passed in the following manner: Let the cut end of intestine nearest the operator's right hand hang free from its mesentery. Pass the needle through the mesentery at a point one-third of an inch from the free edge of the mesentery and one-quarter of an inch from its attachment to the gut. Taking up the needle on the further side of the mesentery, make a Lembert stitch on the surface of the intestine on that side, entering the needle one-third of an inch from the cut edge of the gut and one-quarter of an inch from the attachment of the mesentery to the gut, and keeping it parallel with the mesenteric attachment, bring it out near the cut edge of the gut in the ordinary way (Fig. 1). Then pass the needle back again through

Fig. 1.
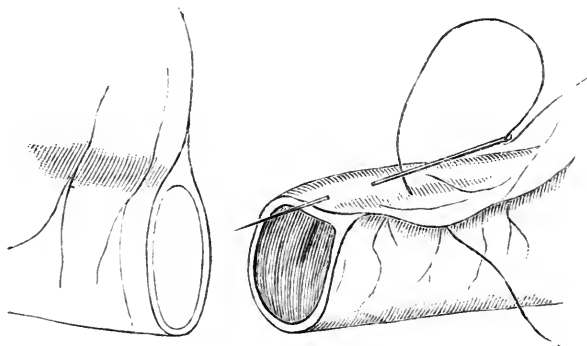
the mesentery at a point one-quarter of an inch from its attachment to the intestine, but near its cut edge, so that the needle will finish upon the same side of the mesentery as it started from. If the thread is now drawn tight, it will be seen that the mesentery is folded down upon the side of the gut by the thread.

Now hold up the other end of intestine by its mesentery, the edge directed toward the first, as it is intended to unite them. Pass the needle through the mesentery of this second end of gut near its cut edge and one-quarter of an inch from its attachment to the intestine. Taking up the needle on the further side of the mesentery, make a Lembert stitch on the surface of the intestine on that side, entering the needle near the cut edge of gut at a point one-quarter of an inch from the attachment of the mesentery, and bringing it out one-third of an inch from the cut edge of the gut and one-quarter of an inch from the mesenteric attachment (Fig. 2). The needle is then to be passed back again through the mesentery at a point one-quarter of an inch from its attachment to the intestine and one-third of an inch from its cut edge (Fig. 3).

The completed stitch is exactly the same on both ends of the gut, although the course of the needle on the second end was just the reverse of that taken on the first.

It will then be seen that the two Lembert sutures are on the same (further) side of the mesentery, and parallel to its attachment to the

Fig. 2.
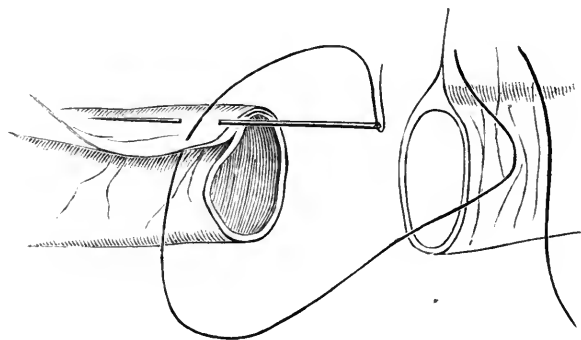
intestine. If the ends of the thread are drawn upon, it will be found that the mesentery of both ends of the gut is folded down upon the sides of the intestine. If they are drawn still tighter, the ends of the gut will be turned in (in the usual way with the Lembert suture), and carry the edges of the down-folded mesentery with them, and a knot can be made in the ordinary manner.

We have thus succeeded in disposing of the thickest part of the mesentery by turning it into the lumen of the intestine, just as the raw edges of the gut itself are turned in. At a distance of one-quarter of an

Fig. 3.
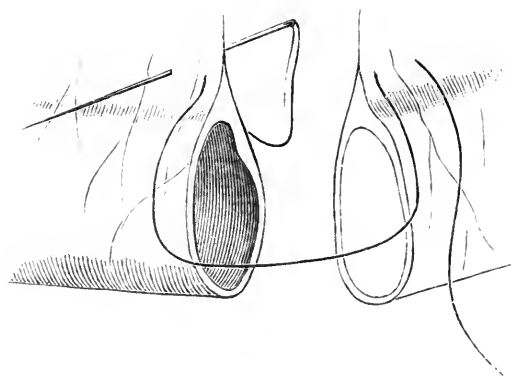
inch from the mesenteric attachment the loose cellular tissue which fills the triangular space between the layers of the mesentery close to the gut is much reduced in quantity, if not altogether absent; and when the mesentery has been turned down upon the side of the intestine as described above, this thin part of the mesentery is the part which will

find its way out of the seam when the ends of the gut are turned in. This is far less likely to interfere with prompt union than the comparatively broad surfaces brought together by the sutures as usually applied. This stitch is much more complicated in its description than in its application, although it cannot be denied that the latter is also difficult. But the much greater security which it affords has proven it to be well worth the additional trouble in the numerous cases in which it has been used.

Having applied this stitch, two Lembert sutures should be inserted close to it, one on each side. One of these has to pass through the place where the mesentery is folded over, making several thicknesses with considerable cellular tissue, and the needle must be made to pass a little deeper than usual in order to take up the muscular coat, otherwise it will tear out very easily.

The following conclusions are justified by the facts already presented:

1. Exploratory laparotomy can be performed without danger.

2. The most common causes of death after contusion of the abdomen, produced as described, are hemorrhage and shock; and the latter is greatly increased by a prolonged operation, such as resection of the intestine.

3. Some cases of internal hemorrhage, otherwise fatal, can be saved by prompt action.

4. Prompt action will save life in contusion, threatened gangrene, and even rupture of the intestine.

5. The danger is greatly increased by delay, as shown by the early occurrence of gangrene, the rapid failure and death of cases left without treatment, and the greatly impaired strength found in cases in which treatment was delayed.

II. Experiments upon the Cadaver.

There are two theories in regard to the mechanical causation of rupture of the intestine by contusion of the abdomen—that it is caused by a blow inflicted upon the gut distended with gas or with fluid contents; and that it is caused by the crushing of the gut, whether distended or empty, between the contusing body and some hard background, usually the spinal column. Longuet[1] dropped a weight upon the bodies of three cadavers, alternately over the spine and to one side of it. In order to gain additional evidence, I have repeated his experiments upon four cadavers.[2]

Including both series of experiments, we obtain a total of five blows delivered in the middle line, causing in three a rupture of the gut, and

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[1] Bull. Soc. Anat., Paris, 1875, l. p. 799.

[2] The author is indebted to Dr. George L. Peabody, Pathologist to the New York Hospital, for the opportunity to experiment upon the cadaver.

in the other two a laceration of the mesentery. On the other hand, of nine blows delivered laterally, in six cases there was no injury; and in the three in which injury was caused, the weight touched the side of the spine in its fall, but in none of these three was a rupture of the gut produced. Thus, in a total of fourteen blows, the eight which struck the spine produced injuries, and the six which did not touch it were harmless.

This evidence proves conclusively that distention of the intestine is not necessary for rupture, but that a contact between the contusing body and some solid resistance, such as would be furnished by the spine or the pelvic bones, is indispensable to produce rupture in the empty gut. But there is still some footing left for the old theory. Can a distended loop of gut be ruptured when it lies upon one side of the spine, where we have proven the collapsed gut to be safe from injury? To determine this point, the following experiments were performed:

An incision about three inches long was made in the middle line of the belly, the lower end of the incision being placed at the pubes. One or more loops of gut were drawn out, inflated with air after isolation between two ligatures, returned to the belly, and placed either over the spine above the incision or upon one side of it, in the lumbar region. The incision was closed by suture, and the weight dropped directly over the prepared loops. This experiment was carried out upon five cadavers.

In this set of experiments, of four blows delivered upon loops lying in the middle line, in front of the vertebræ, rupture of the gut was produced twice, and rupture of its peritoneal coat in the other two cases, in one of which there was also produced a laceration of the mesentery. This last experiment shows how readily the inflated gut may escape rupture, for the descending weight could only have reached the mesentery by pushing aside the intestine, which lay in front of it. One of these experiments shows that the inflated gut may even prevent injury to other structures, for it is the only experiment of all performed by Longuet and myself in which a direct blow upon the spine failed to produce some injury, for rupture of the peritoneal coat can scarcely be considered an injury. We must, therefore, acknowledge that inflation of the gut does not increase the danger of rupture in loops lying against the spine, and may even diminish it.

On the other hand, of seven blows delivered upon loops placed at the side of the spine, in only three was no injury produced, while rupture of the gut occurred three times, and rupture of its peritoneal coat once.

We may conclude that—

1. In contusion of the abdomen the intestine is ruptured by being crushed between the contusing body and the bony parts—the vertebræ and pelvis. This injury is therefore not a true *rupture*, but a *contused and lacerated wound* of the gut.

2. Partial distention of the gut, especially if a large part of the intestine is distended, diminishes the danger of rupture. If great distention of an isolated loop ever occurred in life, it would increase the danger of rupture, even for a loop not in contact with bony parts.

3. The most exposed position for the gut is in contact with the bony parts—in front of the vertebræ, near the brim of the pelvis (when hernia is present), and near the crest of the ilium.

4. There are many chances in favor of escape of the intestine from injury in contusion of the abdomen—there may be no gut lying directly at the point where the blow is inflicted; the gut may be partially inflated with gas; or it may slip away from the pressure exercised by the blow. This fact is of great importance in its bearing upon the question of early performance of laparotomy for rupture of the intestine.

III. CLINICAL.

PATHOLOGY.—116 cases of rupture of the intestine have been collected with the intention of studying the symptoms of the first six to twelve hours after the accident, only those cases in which these symptoms were described with sufficient fulness being accepted. A few exceptions were made to this rule in order to secure examples of rare symptoms, or of rare forms of injury, and thus the proportion of these unusual cases is greater than would be found in a consecutive series of cases, and due allowance must be made for this fact in certain points which will be hereafter pointed out.

The cause of the injury is described in 99 cases. The most common cause is the kick of a horse or man, numbering together 28 cases— twice as many as are due to any other cause. Next to this, and all nearly equal in the number of cases, are the run-over accidents (13 cases), the blows on the belly by heavy weights (16) and by light weights (13), and the falls upon projecting points (13). The so-called "buffer accidents" are comparatively rare (4 cases). It is evident that the great velocity and small area of striking surfaces are the elements which make a kick so dangerous.

The relative frequency of injury in different parts of the intestine is shown by the following: in 113 cases, the duodenum was injured 6 times, the jejunum 44, the ileum 38, other portions of the small intestine 21 times, and the large intestine only 4 times. This proportion indicates that the liability of the jejunum to injury is no greater than that of the ileum. The duodenum escapes on account of its sheltered position. In 43 cases the exact site of the rupture is given in the jejunum and ileum, and in 25 (58 per cent.) of these it lay in the first three feet of the jejunum, or in the last three feet of the ileum. In 12 cases (28 per cent.) the rupture was situated in the first eighteen inches of the jejunum, and in 6 (14 per cent.) in the last eighteen inches of the ileum. These facts bear

out the old theory that the danger of rupture is greatest in those parts of the intestine which are most fixed in their position in the abdomen, but the large intestine must be excepted on account of its sheltered position.

Of the entire 116 cases the rupture extended completely across the intestine in 20 cases, and almost across in 4. In 11 cases there were multiple ruptures, in 2 of these there were four ruptures, in 2 there were three, and in 3 two. In only two of the cases in which the rupture extended part-way across the intestine is it mentioned that the mesenteric border alone was involved. In only one case[1] was the rupture so situated as not to communicate with the peritoneal cavity, and then it lay on the posterior wall of the duodenum where it passes behind the mesentery.

The rupture varies from the size of a quill to one which will admit four fingers, but is most frequently about one inch in diameter. Is there any constant relation between the force of the blow and the extent of the rupture? A study of the twenty cases in which the rupture was complete, shows that the blow was severe in all but two. On the other hand, among the causes of the twenty-two cases in which the rupture was half an inch or less in extent, there are only three in which the blow appears to have been severe. These cases warrant the assertion that the amount of injury will be proportional to the violence of the blow, but that exceptions will not be infrequent. A small rupture, however, is almost as certain to prove fatal as a large one, so the question has very little practical importance. A striking instance of this is a case[2] in which the rupture was only one-third of an inch in diameter and yet death occurred in sixteen hours.

Eversion of the mucous membrane at the injured point is the rule, being mentioned as present in ten partial, and four complete ruptures, while it is noted as absent in only two cases. Jukes also records a case[3] in which there was an extensive lesion of the peritoneal coat, with a rupture of the bowel the size of a goose-quill, with no eversion of the mucous membrane—fecal extravasation and peritonitis were present and death had occurred forty hours after the accident. In one of our cases[4] the mucous membrane rolled out and the peritoneum turned in, the two covering the cut edge of the muscular coat.

Fecal extravasation is almost invariably present, but may be delayed, or even absent. It is recorded as present in seventy-three cases, but the presence of peritonitis in nearly all the rest makes it probable that it was present in them also, although peritonitis may possibly arise from other causes than fecal extravasation. In nine cases it is recorded as

[1] Gärtner : Vierteljahrschrift f. prakt. Heilk., Prag, 1854, xlii p. 44.
[2] Annan : American Journal of the Medical Sciences, xxi. p. 530, 1837.
[3] Jukes : Med. Chir. Journ. and Rev., v. p. 269, 1818.
[4] Chavignez : Bull. Soc. Anat., Paris, 1839, xiv. p. 217.

absent. In some of these cases peritonitis was present, but they show that it is not impossible for fecal extravasation to be wanting. In two cases[1] of complete rupture, the open ends were so entirely closed by muscular contraction, prolapse of the mucous membrane, and rapidly formed adhesions, that the bowel was actually found to be distended above the injured point. In such a case it is easy to understand how fecal extravasation could be prevented—and, in fact, in one of these cases the onset of symptoms was delayed. This condition would be more likely to occur with complete ruptures than with partial—unless the latter were very small, just as hemorrhage is more severe when an artery is wounded in part of its circumference than when it has been entirely divided and the injured end is free to contract and retract. The phenomena observed in the experiments upon dogs as to the contraction of the intestinal muscle furnish excellent illustrations of this subject.

With rupture of the intestine were found in twelve cases contusions and other slight injuries of the gut. Contusion of the gut may lead to peritonitis even when not so severe as to cause gangrene and perforation, as has also been shown by Grawitz,[2] the diminished vitality of the tissues allowing microörganisms to penetrate them and set up inflammation in the adjacent peritoneum. Similar conditions are seen in practice, in the peritonitis accompanying intestinal obstruction, or following the reduction of a strangulated hernia.

The most frequent and important complication of rupture of the intestine is laceration or contusion of the mesentery. The hemorrhage from the ruptured gut is trifling unless the mesenteric border is involved, and even then it is not usually serious. But hemorrhage from laceration of the mesentery may cause death in a few minutes, and even slight injury to its vessels may deprive part of the intestine of its blood-supply, and cause gangrene, although the gut itself have escaped injury. There are four cases of contusion, and fifteen of laceration of the mesentery, complicating the cases of rupture of the intestine. Of the last set of cases all but three of the patients died within twenty-four hours, and in these three no mention is made as to the state of the circulation in the gut at the time of death. In some of those in which death occurred early, gangrene of portions of the gut was inevitable; and in a case in which laceration of the mesentery was the only injury, it was found that gangrene had already taken place at the time of death. The frequency and gravity of this complication of rupture of the intestine does not seem to be properly appreciated. It occurred in sixteen per cent. of the cases collected, and we have already seen how often it was produced in the experiments on dogs. Probably the smaller lacerations (competent,

[1] Partridge: Trans. Path. Soc., London, 1860–1, xii. p. 109. Poland: Med. Times and Gaz., ii. p. 445, 1868.

[2] Charité-Annalen, xi. Jahrg., p 770, Berlin.

however, to produce gangrene) are frequently overlooked in the autopsies made in cases of contusion of the abdomen dying in the first twenty-four hours, and many such cases with symptoms of severe internal hemorrhage are allowed to pass without autopsy on a diagnosis of rupture of the liver or spleen, in which the real lesion is a laceration of the mesenteric vessels, with or without injury to the intestine.

SYMPTOMS OF THE EARLY STAGE. — The symptoms immediately following the injury are of the greatest importance, for the diagnosis must be made as soon as possible, if the treatment is to be successful.

These symptoms are shock, with or without loss of consciousness, restlessness, vomiting, retention of urine, absence of fecal passages, local pain and tenderness, and the physical signs afforded by examination of the abdomen. The condition of the pulse at this time will not need separate consideration, as it depends upon the amount of shock, and hemorrhage, and often does not assist even in a distinction between these. The temperature is of little value as a guide, although it is sometimes subnormal when the shock is great, and may rise as peritonitis develops.

The symptoms may all appear immediately upon receipt of the injury, or one or all may be delayed for some hours. Delay in the appearance of symptoms was present in ten cases, and some are so remarkable as to deserve a fuller account.

A boy,[1] thirteen years old, received a blow upon the abdomen from the pole of a churning machine, walked a mile with but little assistance, had great pain and vomited frequently and persistently, but the symptoms were "not at all marked." In twelve hours sudden collapse came on, and death followed one hour later. Autopsy showed a complete rupture of the duodenum.

A man,[2] nineteen years old, fell from his cart while drunk, and the wheel passed over his body. He was insensible from drink, and vomited the contents of his stomach, but there was no shock and no other symptoms. The next day he felt well, there was no tenderness in the abdomen, and the urine and stool were passed normally. He was allowed to walk about the ward of the hospital, and to eat three meals of bread, broth, and milk. Twenty-six hours after the accident, and half an hour after the last meal, sudden cramping pains in the abdomen came on, collapse followed, and death in one hour and a half. Autopsy showed a complete rupture of the jejunum.

A strumous girl,[3] eleven years old, in running up stairs, fell and struck her abdomen, at the level of the umbilicus, on the edge of a step. She cried a little, but walked up stairs, then vomited the contents of her stomach, fell asleep and slept half an hour. She seemed a little faint, and was kept in bed, but she felt well and had no pain. She slept well all that night. Twenty hours after the accident she walked down stairs, after which she felt slight pain in the abdomen for awhile, and there was some tenderness. Four hours later she ate a few mouthfuls of egg-pudding, the first food she had taken since the accident, vomited it, fell into collapse, and died at once. Autopsy showed a rupture of the jejunum extending for half of its circumference (the edges bruised, the mucous membrane appearing as if it had not been everted), fecal extravasation, and beginning peritonitis.

[1] London Medical Gazette, 1833, xii. p. 766.   [2] Walker: Lancet, 1881, ii. p. 637.
[3] Holland: British Medical Journal, 1873, i. p. 703.

The proportion of these cases to the entire number in the table is misleading, for such peculiar cases are much more likely to secure publication than those which run the ordinary course. The true proportion must be far less than one in eleven.

Shock. In 95 of the cases the presence or absence of shock is noted. Shock was present in 76 cases—80 per cent.; and absent in 19 cases—20 per cent. It is described as severe in 30 cases, and as slight in 16 cases.

Consciousness. Consciousness was retained at the time of the accident in 54 cases, was almost lost in 4 cases, and was lost in 11 cases. But four of the cases in which it was lost lived two, four, and seven days, and the symptom is altogether unreliable as an indication of the severity of the injury, and even of the degree of shock present.

Restlessness. Restlessness is not a common symptom. It is noted as present in the early stage in eight cases; while it appeared in one case after six hours, in one case after twelve hours, and in two cases on the third day. The last two cases do not properly belong here, but they are quoted to show that restlessness is not exclusively a symptom of internal hemorrhage. In these cases it is doubtless to be regarded as due to the peritonitis—perhaps merely as an unusual symptom of the accompanying fever. In two of the cases there was no hemorrhage, and in two it was slight, and yet this symptom was present from the first. In these cases restlessness must be regarded as part of the symptom-complex of shock.

Vomiting. Data as to this symptom in the early stage are given in 90 cases. Vomiting was present in 72 cases—80 per cent.; and absent in 18 cases—20 per cent. There was nausea in four of the cases in which there was no vomiting, and in most of them vomiting appeared as a symptom of the later stages. The vomiting was severe in one-third of the cases in which its presence was noted, and it is described as slight in only five cases. The vomiting may be continuous, or occur at long intervals, and in some cases it even ceased entirely for some time, returning later. The contents of the stomach were first expelled, and then bilious matter. In five cases blood was present (including two cases of dark brown vomit), in one in clots. The ruptures were situated in the duodenum, jejunum, ileum (two cases), and " small intestine," showing that hæmatemesis does not indicate a rupture near the stomach. In two of these cases there was severe hemorrhage into the peritoneal cavity, and in one of them the stool was also bloody, complete rupture of the jejunum having occurred, and the blood probably finding its way into the peritoneal cavity, and into both ends of the bowel from an injured vessel on the edge of the wound. When life lasts for some time the vomiting may become fecal, but the study of this symptom must be deferred for the present.

Constipation will be seen to be the rule, but it must also be considered with the late symptoms, for the fact that no stool was passed in the first six hours would be of no clinical importance.

Urinary symptoms. These are important in excluding injury of the bladder and kidney. The character of the urine is unchanged in uncomplicated rupture of the intestine, yet there are two cases in which the urine was slightly bloody; the account of the autopsy not explaining this symptom, which must have been due to some slight contusion of the bladder or kidney. But the functions of the bladder are very frequently disturbed. Their condition is noted in 47 of the cases. Retention was present in 25 cases (one had stricture). Urination was difficult in 1 case, and normal in 17 cases—less than 50 per cent. Tenesmus was present in 4 cases.

The retention is, doubtless, to be looked upon as part of the condition of shock, but the tenesmus is not easy to explain. In one case there was severe hemorrhage into the belly, and this may have been the cause of the tenesmus. Suppression of urine occurred in one case—probably due to the severe shock present, from which the patient never reacted, although life lasted three or four days.

Pain. Pain in the abdomen is one of the first and most constant of the symptoms of rupture of the intestine, and it is usually severe. Pain was present in 104 cases—92 per cent.; and absent in 9 cases—8 per cent. It was severe in 74 cases—89 per cent.; and slight in 9 cases —11 per cent.

The pain may be burning or twisting, continuous or lacinating, but usually resembles the pain of colic. It may begin as a slight pain, and grow worse gradually or suddenly, or it may continue slight throughout. In some cases it ceased for a time, after longer or shorter duration. In nearly all the cases in which it was delayed, in common with the other symptoms, it appeared suddenly, and as the forerunner of speedy and fatal collapse. It is frequently so intense that morphine seems powerless to relieve it.

Pain was absent in the early stage in 9 cases, but developed later in 6 of these. One of the six was a man who was kicked by another upon an old hernia, and had no symptoms for six hours, and the delay was probably due to the fact that the extravasated fecal matter did not at once reach the general peritoneal cavity. There was no pain throughout the course of the case in two remarkable instances, which follow.

A boy,[1] six years of age, was crushed between a wagon and a fence. The only symptoms present were weakness, vomiting, and constipation. Death occurred in two and a half days. Autopsy showed a rupture extending entirely across the ileum, and peritonitis.

[1] Bentley: Pacific Medical and Surgical Journal, 1872, vi. p. 128.

A man,[1] thirty-six years old, suffering from general paralysis of the insane, fell while running away from an attendant, and the latter fell upon him. Vomiting and hiccough were present, but he felt no pain at any time, and lived for three days.   Autopsy showed a rupture of the jejunum the size of a quill, with peritonitis.

Early collapse will frequently cause the pain to be apparently absent in the first hours after the injury; and opium used in treatment may conceal it at a later period, therefore care is necessary to exclude these sources of error.

Tenderness. We have notes as to the existence of tenderness in the early period in 62 cases.   Tenderness was present in 55 cases—89 per cent.; and absent in 7 cases—11 per cent.   It is described as great in 20 cases, and as slight in 4 cases.   In one of the cases in which it was absent the statement is made that the pain was relieved by pressure.   Of the seven cases in which tenderness was absent at first, its later appearance is noted in three, and one other, a child of four years, run over by a dray, was in collapse from the time of the accident until death, five hours later.   In the remaining cases no mention is made of its later development, although life lasted one, two, and two and a half days. The following case is remarkable for the slight pain and tenderness:

A man,[2] thirty-two years old, fell twenty feet, from a tree, flat upon the ground, face downward, but arose and walked two hundred yards.   In one hour there was pain in the abdomen, very little shock, and retention of urine. In three hours he vomited a little blood in clots, and the temperature rose to 100.6° F., but he remained cheerful.   In twenty hours he could bear firm pressure on the belly, but there was tenderness in the iliac region.   In twenty-four hours the belly was distended, he had pain for one hour, but it passed off. He remained comfortable and cheerful, and died quietly thirty-six hours after the accident.   A rent in the ileum, which admitted three fingers, was discovered on autopsy.

Distention of the abdomen.   This condition was present early in 33 cases, and later in 9—a total of 42.   In 5 cases the belly is described as tense.   Distention occurred at once in 2 cases; in 1 case it occurred "soon;" in another it immediately followed the reduction of a hernia upon which the blow had been received; and in 1 case it took place suddenly when the patient went to the closet to stool, some hours after the accident.   Distention was absent at first in 16 cases, but it probably occurred later in most of those who live long enough to develop peritonitis.

Tension of the abdominal muscles.   In 8 cases the abdomen is described as "tense," or "rigid," or "hard."   In 8 the abdomen was "soft," or "natural," and in 8 others there seems to have been no contraction of the abdominal muscles.   Therefore, the flat and tense belly, which is looked upon by some as symptomatic of perforation of the gut,

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[1] Yellowlees: Glasgow Medical Journal, 1875, vii. p. 415.
[2] MacLean: British Medical Journal, 1884, i. p. 267.

is frequently absent, for we have seen that the belly is usually distended, and even when flat it is more frequently soft than hard.

Tympanitic resonance. The percussion note was tympanitic in 25 cases in the early stage, and later in 6 others. In 4 cases this is the only description given of the belly, leaving us in doubt as to whether distention was present or not, but in only 1 case is it expressly stated that there was no distention. We may fairly assume that the percussion note was tympanitic in the cases in which distention was present. This would increase the total to 36 cases.

Dulness on percussion. In 6 cases an area of dulness was detected in the early stage, and in only 2 later.

Loss of liver dulness. The disappearance of the dulness on percussion over the site of the liver has long been considered a valuable sign in perforation of the intestine. Its uncertainty has also been frequently alluded to, especially its uncertainty as a negative sign. In only 4 of the cases collected has this point been noted. In 3 cases the liver dulness persisted, but in 1 of these the perforation was in the duodenum and extraperitoneal. In 1 case[1] the results of percussion were at first normal, but in twelve hours tympanites developed and the liver dulness disapppeared. We have then 2 cases in which it persisted to 1 in which it was lost. The latter case, indeed, is conclusive evidence that loss of liver dulness is not an immediate and necessary consequence of perforation of the bowel, else it would have occurred in that case at once, if at all.

It is evident that this sign depends upon certain conditions. There must be gas in the intestine, and it must escape before adhesions which could limit it have time to form; for although it is possible for gas to be generated in the peritoneal cavity this is a rare occurrence. The liver, too, must be free from adhesions which would retain it in its position. Even as a positive sign, loss of liver-dulness cannot be relied upon, unless it is certain that it had been present previously. The various conditions which might mislead in this respect are cirrhosis, backward dislocation of the liver, extreme tympanites, or an actual misplacement of the colon between the liver and the abdominal wall. The first condition could scarcely lead to error, for there would be the presence of other symptoms of the disease, even in the absence of any history. Dislocation of the liver is a very rare condition, and so is the misplacement of the colon, but if the latter ever occurs during life it would be likely to be found after such severe disturbance of the abdominal organs as must be occasioned by the great force which produces these injuries. Extreme tympanites is the condition which will most frequently trouble the surgeon in this respect, but if the liver has been forced above its normal

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[1] Beck: Deutsche Zeitschr. f. Chirurgie, xv. i. p. 11.

position that fact can generally be determined by careful examination of the thorax. We may, therefore, conclude that total absence of liver-dulness is a tolerably certain proof of rupture of the intestine in these cases, but that its persistence is of no value as a sign that there is no perforation.[1]

LATER SYMPTOMS AND COURSE.—The later symptoms are chiefly those of peritonitis, or septicæmia. We must give fuller consideration to the temperature, the constipation, and the fecal vomiting.

Temperature. The temperature is noted in 38 cases. In 7 cases there was no rise at any time, and in 4 of these the temperature was sub-normal throughout. The average duration of life in these 8 cases was forty-four hours—not much less than what we shall find to be the average duration in all cases—forty-eight hours. Of the 31 cases with fever, the rise began during the first six hours in 7 cases, during the first twelve hours in 15 cases, and in all but 5 cases during the first twenty-four hours. One exceptional case had no fever until the fourth day. The highest temperature of the first six hours was 39° C. The average duration of life in the 30 cases with fever (one case being omitted, because laparotomy was performed) was sixty hours.

Constipation. In 22 cases there was no stool until death—an average of three and one-half days, and in 3 others the bowels were moved by purgatives. In 5 cases the bowels were moved, and in 1 of these there was diarrhœa, but the latter may have been accidental, and not caused by the injury. Blood was present in the stools in only 1 case, and in another the stools were black. This fact and the prevailing constipation show how valueless the well-known symptom of "bloody stools" will prove in diagnosis.

Fecal vomiting. Fecal vomiting occurred in 12 of the cases collected, being nearly 10 per cent. of the whole, and 17 per cent. of all the cases in which vomiting took place. It is, therefore, rather a common symptom. Fecal vomiting began as early as twelve hours after the accident in 1 case, and in 7 cases within the first thirty-six hours; in the other 5 cases it began on the third to the fifth day. In 2 cases there had been no previous vomiting, and in these the fecal vomiting began late. In 5 of the cases there was no stool, and in the rest the state of the bowels is not described, but as all but 1 of these died within thirty hours of the accident their testimony is not important. When the case is obscure, and fecal vomiting and constipation are both present, the likeness to intestinal obstruction may be very close—as it is in those cases of non-traumatic perforation-peritonitis in which laparotomy has been performed under a mistaken diagnosis. In one of the cases which began late, autopsy showed a complete obstruction of the gut at the point

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[1] For a full discussion of this question see Ebstein's paper on perforation-peritonitis, Zeitschr. f. klin. Med., 1885, ix. p 209.

of rupture. In the other late cases it may have been caused by the mechanical obstruction caused by the forming adhesions. But in the early cases it is not so easy to explain, although a similar symptom is found in peritonitis due to perforating ulcer of the intestine. We might suppose a spasmodic or paralytic obstruction caused by the shock due to the injury, to the beginning peritonitis, or to the mere presence of fecal matter in the peritoneal cavity—but the whole matter is as yet too obscure to warrant even a supposition.

The peritonitis which the fecal vomiting accompanied was evidently septic or purulent, except in two cases which are described as "fibrinous," and, perhaps, here also, for it is not easy to exclude the septic element in such cases, yet in one of these there was no fecal extravasation to be detected.

The situation of the rupture in the bowel seems to exercise no influence upon the occurrence, or the time of appearance of this symptom, for it accompanies ruptures in all parts of the intestinal canal.

Fecal vomiting was usually a sign of impending dissolution, appearing within twelve hours of death in 5 cases, although 2 cases lived three days after it began. The prognosis is worst when it begins in the first twenty-four hours, for of 6 such cases 5 died within thirty hours after the accident. All the cases in which fecal vomiting occurred are divisible into two classes: 5 cases which died within thirty hours of the accident, and 7 cases which lived from three to eight days, and there is a remarkable absence of cases living what we shall find to be the most common length of life after the accident—forty-eight hours.

Course.—In studying the course of rupture in the intestine we must distinguish three sets of cases:

In the first set the shock caused by the accident never leaves the patient, may never diminish, but passes rapidly or slowly into a collapse which lasts until death. While this is a characteristic of the cases in which hemorrhage accompanies the injury, it is not confined to them, for we have seen that the accident itself, or fecal extravasation (occurring at the time, or subsequently) may produce a collapse which will prove fatal in a few hours. In this set of cases the duration of life is short, and may be even less than an hour, but occasionally it may be prolonged for days. When death is delayed, it is impossible to distinguish the boundary line dividing shock from septic poisoning, but the latter is the true cause of death if death does not occur soon after the accident, unless fecal extravasation has also been delayed. In the rare cases in which symptoms do not develop immediately, the clinical history begins with the first appearance of the symptoms, rather than with the accident. The still rarer cases in which there is no shock at any time must be classified with the following—omitting the first stage of shock and reaction.

The second set of cases includes those in which a frank peritonitis develops, with abdominal pain and tenderness, tympanites, and fever after the shock has passed off. These are the cases in which the diagnosis is easiest, but, unfortunately, they are not the most common.

The third set of cases is the most numerous. It comprises those in which, instead of an evident peritonitis after reaction from the shock has taken place, there are vague symptoms which keep the surgeon in expectation that peritonitis is about to develop, but nothing upon which he can found a positive diagnosis, for such light indications are common enough in the cases in which ultimate recovery has taken place. The patient lies in a state of apathy, seemingly satisfied with his condition, and thus misleads those about him; or he becomes gradually weaker, and because less able to complain, appears to be improving; or the symptoms of peritonitis develop by degrees, and so slowly that no one can say of any moment that it marked the beginning.

PROGNOSIS.—The prognosis in rupture of the intestine may be said to be absolutely bad, for even a suppositious case of recovery after this accident is so rare as to be a surgical curiosity. The following case[1] possesses great interest in this connection:

A blacksmith, forty-seven years of age, was struck in the right iliac region by the butt of a shotgun, which discharged unexpectedly while he was holding it. He immediately felt chilly and weak, and agonizing pain and vomiting soon set in. In forty-eight hours he was suffering from an acute attack of peritonitis, the belly somewhat swollen and hard. At the site of the injury there were tenderness and dulness on percussion; elsewhere tympanitic resonance. There was no external mark of injury. The stomach rejected everything; there had been no stool. He was very sick for five days, then improved. Ten days after the injury, getting out of bed, he became entangled in the blanket and fell upon the floor, face downward. Immediately he had frightful pain in the belly, vomiting began, collapse set in, and he died in fourteen hours. The autopsy showed the omentum adherent to the wall of the abdomen at the site of the blow, the intestines adherent and injected. Between the parietal peritoneum and the muscles was an extravasation of blood, the size of the palm of the hand. In a loop of intestine, lying half way between the umbilicus and the pubes, was a rent admitting four finger-tips. Fecal extravasation.

It is probable that in this case a small rupture took place at the time of the blow, with an extensive contusion of the gut. Adhesions closed in both, and the fall separated these and also tore open the weakened contused part.

Duration of life. An average computed on 112 cases gives the duration of life after the accident as forty-eight hours. That this average is not obtained by the union of extremes, but is a natural one, is shown by the fact that 8 cases died in the first twelve hours, 52 cases (46 per cent.) in the first twenty-four hours, and 82 cases (73 per cent.) in the first forty-eight hours. 4 cases lived eight days.

[1] Atlee: Med. and Surg. Reporter, lii. p. 6, 1885.

Evidently nothing is to be hoped from nature, and whatever improvement is to be made in the prognosis must be obtained by operative treatment. The history of what the latter has done up to the present time can be told in a few words. Omitting the cases of rupture of the intestine in a hernial sac, treated only by the ordinary operation for hernia, there have been recorded eight cases[1] of laparotomy with treatment of the ruptured intestine—six times by suture, twice by the clamp. Of these cases, six died soon after the operation; Bouilly's case lived ten days; Croft's four weeks.

In addition to these cases, laparotomy has been performed four times after contusion of the abdomen,[2] the lesions present being contusion of the colon and pancreas, rupture of the spleen (two cases), and rupture of the liver. These five cases terminated fatally, but the operation did no injury, and in some instances brought about a temporary improvement.

Two of the cases of laparotomy for rupture of the intestine can be claimed as recoveries, for Bouilly's case died of a fresh peritonitis set up by a rough examination of the artificial anus, when the original inflammation had entirely subsided; and Croft's case apparently died of inanition due to the artificial anus. In all the other cases the operation was undertaken so long after the injury that there was no hope for success. These two cases, however, with the case reported by Mikulicz,[3] prove that a peritonitis with fecal extravasation is amenable to surgical treatment. We may, then, confidently expect better things in the future, although the cases with very obscure symptoms, and those in which collapse sets in very early, must always remain beyond the reach of treatment.

DIAGNOSIS.—In attempting to make a diagnosis of the precise injury produced by a contusion of the abdomen, the cause of the injury and the exact situation of the blow should first be ascertained as accurately as possible. Certain causes, especially the kick of a horse or man, have been shown to be particularly liable to produce rupture of the intestine. The site of the blow, too, will often give a clew to the organ which has been injured—the liver, spleen, or bladder. In order to cause a rupture of the intestine, the blow must be so directed as to crush the gut between the contusing body and the spine or pelvis. The existence of hernia, the presence of bowel in the hernial sac, and the wearing of a truss at the time of the accident, all increase the liability to rupture of

[1] Dr. Gregory (operated 1876, St. Louis): Brit. Med. Journ., 1887, i. p. 1037. Demons: Rev. de Chir., May, 1885, p. 421. Girdlestone: Austral. Med. Journ., 1883, v. p. 100. Fitzgerald; Ibid., p. 264. Bouilly: Bull. Soc. de Chir., Paris, 1883, ix. p. 698. E. Owen: Lancet, 1885, ii. p. 663. Waggener: St. Louis Cour. of Med., 1886, xvi. p. 204. Croft: Brit. Med. Journ., 1887, i. p. 975.

[2] Chavasse: Bull. Soc. de Chir., Paris, 1885, xi. p. 123. Willett: St. Barth. Hosp. Rep., xix. p. 203. Mackellar: Brit. Med. Journ., 1887, i. p. 1037. Croft: Ibid., p. 976.

[3] Volkmann's Samml. klin. Vorträge, No. 262, p. 2315.

the intestine. A former attack of peritonitis, or the presence of hardened feces in the intestine would also naturally increase the danger.

Contusion of the abdomen, with recovery. About four-fifths of all cases of contusion of the abdomen end in recovery. Thus Bryant (*Surgery,* fourth edition, p. 485) states that in seventy-one consecutive cases of contusion of the abdomen treated in Guy's Hospital, there was injury to some of the viscera in seventeen, there was peritonitis ending in recovery in ten, and in the remainder the symptoms were of short duration, and there was evidently no visceral injury. A number of cases of contusion of the abdomen ending in recovery have been collected and studied, with especial reference to the symptoms of the first six hours after the accident, in the same manner as the cases of rupture of the intestine. Almost all of these cases have been collected from literature, and therefore represent the severest forms of this injury.

Let us consider the symptoms of these thirty-three cases in the same order as has been followed for those of rupture of the intestine. In simple contusion of the abdomen the symptoms are at their worst at first, and in nearly all the cases a progressive improvement was observed when the change had once begun. But some of them developed peritonitis—fever, abdominal pain, and tenderness, tympanites, and vomiting being present as its symptoms. In a solitary case[1] the patient rallied from the shock which was present at first, and relapsed later. But this is so rare an occurrence that such a relapse is an almost certain sign of internal hemorrhage or injury to some of the viscera.

Shock was present in 28 cases, absent in only 1—a far larger percentage than in rupture of the intestine. The shock was severe in a remarkably large number—18 cases (66 per cent.); while it is noted as slight in only 4 cases. The shock was also very frequently of long duration—in 60 per cent. of the cases. In only 6 cases was it noted as short. In 6 cases it lasted several hours, and in 3 cases twelve, twenty-four, and sixty hours respectively.

Restlessness was present in only 3 cases, in 2 of which it was great, evidently due to internal hemorrhage.

Vomiting was present in 14 cases, 4 of which are said to have been severe, and 2 slight. It is noted as absent in 10 cases, but in 4 of these there was nausea. Vomiting appeared later in 5 cases in which it had not been present at first, usually as a symptom of peritonitis. Fecal vomiting was never noted, but in 2 cases the vomited matter is described as "altered blood" and "dark like feces." Vomiting, then, is less severe than in rupture of the intestine.

The stools contained blood only once. Constipation was the rule, but was probably due to opium in most cases. 7 cases had no stool for from

[1] Le Gros Clark: Diagnosis of Visceral Lesions. London, 1870, p. 266. (Supposed rupture of the liver.)

two to four days; in 1 the bowels were regular; 2 had passages very soon after the accident, followed by constipation; and 1 had a free diarrhœa on the fifth day.

The urine was bloody in 3 cases; in 1 from contusion of the kidney, and in 1 perhaps from contusion of the bladder. Retention of urine was present in one-third of the cases in which the function of the bladder is noticed.

Pain was present in the abdomen in 29 cases, in **14** of which it was severe, and the pain may be as great as in any case of rupture of the intestine. Tenderness was present in 20 cases, in 8 of which it was described as great, and in 2 slight. There was no tenderness in 1 case, but it developed later also in this.

Physical signs. In 4 cases the abdominal muscles were tense. The abdomen was distended in 12 cases in the early stage, and in 2 others later, and distention is noted as absent in 1 case. This distention may occur immediately after the injury, proving that it must be a result of shock to the nervous centres, and very closely simulating rupture of the intestine, with escape of gas into the peritoneal cavity.

Tympanitic resonance was present early in 7 cases, and in 1 later. Dulness on percussion was present in 4 cases—in 1 at the site of the blow, and in 1 a movable dulness indicating fluid (blood) in the belly. The condition of the area of liver dulness is not given in a single case.

In fact, the symptoms are almost identical with those of rupture of the intestine, except in intensity and duration.

In a few cases of contusion of the abdomen it will be possible to decide what organs have been injured, but in by far the greater number of cases a diagnosis cannot be made. Thus local pain and tenderness would indicate rupture of the liver, spleen, or bladder; bloody urine, retention, tenesmus, and the facts learned by catheterization would allow of a diagnosis of rupture of the bladder; free blood or urine might give an area of dulness on percussion changing with position; signs of internal hemorrhage would make rupture of the liver or spleen probable, and next to these laceration of the mesentery; absence of these symptoms, and the presence of severe shock, great abdominal pain and tenderness, severe vomiting, and early development of peritonitis would favor rupture of the intestine. It will seldom be possible to decide, during the first six hours or more after the accident, whether the intestine has been ruptured or not. However slight the symptoms may be, it cannot be justifiable to declare that no visceral injury has resulted until several days, free from symptoms, have elapsed, for the symptoms may remain latent after injury to almost any of the abdominal organs, and such a course is not infrequent with rupture of the intestine and bladder. Even when the contusing force has been apparently trifling the greatest care should be exercised in giving a prognosis. If the

visceral injury is merely a contusion of the intestine, the appearance of serious consequences may be delayed as much as a fortnight.[1]

TREATMENT.—Since the establishment of the rule that in penetrating gunshot wounds of the abdomen, immediate laparotomy is necessary, without waiting for symptoms of injury to the intestine, some have sought to extend the application of this principle to penetrating stab-wounds, and to all severe contusions of the belly. It is true that if rupture or severe contusion of the intestine has taken place, death is inevitable, unless laparotomy is performed at a very early period, just as this is true of gunshot wound of the bowel. But the intestine will almost certainly be wounded with penetrating gunshot wound of the belly, while in the severest forms of contusion, let the force be the most violent and the symptoms the most acute, there are, as we have already shown, many chances that the gut shall escape unhurt. Accordingly, the treatment of contusions of the abdomen must be wholly symptomatic—the surgeon having no right to assume that rupture of the intestine has taken place until symptoms appear which indicate its occurrence.

If it is apparent that hemorrhage is present, we should try to control it by pressure upon the abdomen, a firm pillow being bound upon it as tightly as can be endured, although one of the experiments on dogs showed that but little advantage is to be gained from any pressure which can be borne without anæsthesia. Morphine should also be given with care to quiet the circulation, and to relieve the intense pains in the belly and limbs, sometimes so excruciating that no amount of the drug consistent with safety can entirely prevent them, and stimulants must be withheld as far as possible. If the patient continue to sink, the surgeon should proceed at once to laparotomy, for many of these cases bleed to death from vessels which could be easily reached and ligated. To inject blood or salt solution into the veins of a patient while the blood is escaping elsewhere, is like pouring water into a vessel with a hole in the bottom, or as if one should treat a woman, dying of hemorrhage from placenta prævia, by transfusion without putting a tampon in the vagina.

After the vessels have been secured, stimulants and transfusion come into their proper place, and must be called upon at once to make up the loss of blood. Great collapse would contraindicate any operative interference, for laparotomy demands a certain amount of strength in the patient, and when the latter is very weak, it is already too late to save his life by operation.

If the case present no sign of hemorrhage, or if the hemorrhage soon cease, and there are no evident symptoms of rupture of the intestine, expectant treatment must be adopted; absolute rest in bed, very limited fluid diet, administered in small quantities, as little morphine as possible,

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[1] L. Muguier: Thèse de Paris, 1883, reviewed in Centralbl. f. Chir., 1884, p. 181.

in order not to obscure any symptoms about to develop, and continuous watching of the patient to detect the slightest change, for the only chance of success in these operations depends upon their performance at the earliest possible period, before septic poisoning and peritonitis can fully develop, and before the strength of the patient has been exhausted by pain and vomiting. Every rude method of examination, such as rough pressure on the abdomen to detect points of tenderness, or attempts to elicit "succussion sounds," are to be carefully avoided. Ordinary diet, large quantities of water, emetics, purgatives, and even enemata are to be absolutely prohibited. It is important to give no more morphine than is necessary to make the patient's sufferings endurable, seeking rather to relieve pain by hot applications to the abdomen, if no hemorrhage is present. Morphine probably acts in peritonitis only by relieving pain, and diminishing peristalsis. If we had the power of instantaneously and completely paralyzing the peristaltic movements of the gut immediately after rupture of the intestine had taken place, doubtless the best treatment would be to stop them at once and not allow them to recommence until time had been given for the formation of permanent adhesions. But we have no such power, for it is improbable that morphine can produce its effect upon peristalsis in time to prevent fecal extravasation, as the escape of feces probably occurs in most cases within a few minutes of the accident. The benefits to be gained by immediate and energetic use of opium in these cases do not counterbalance the greatly increased risk for the patient caused by the concealment of symptoms upon the early recognition of which his safety depends, if rupture of the intestine has taken place.

A typical case of rupture of the intestine would present shock, great abdominal pain and tenderness, severe vomiting, and perhaps a rise of temperature in the first few hours—the symptoms not improving with time. The physical signs, abdominal distention or retraction, loss of liver dulness, etc., might or might not be present. But the chief difference between these cases and those in which the intestine has escaped injury is the persistence of the symptoms, or their continued aggravation, and sufficient time must be allowed to elapse to determine this point—at least six hours. In a well-marked case with these symptoms, laparotomy is justifiable. If shock, pain, or tenderness be absent, the case is doubtful, and operation must be delayed until it becomes clearer. By far the largest number of cases will fall into this latter category. If there is a strong probability of rupture, an explorative operation is advisable; but the decision when operation is indicated, and how far it should be carried, must be left in each case to the judgment of the surgeon, as it is impossible to formulate rules for distinguishing cases which shade off into one another by such insensible gradations.

A few words are necessary in regard to the technique of these operations.

The incision must be a long one, for we have to deal with the normal abdomen; not distended, and with atrophied tissues, as in cases of abdominal tumor. The length of the incision for the exploration should be at least four inches. The length for the complete operation, when all the intestine is to be drawn out for examination, and the examination cannot be complete without this, should be at least eight inches, unless the abdominal walls are unusually relaxed. The centre of the incision should, as a rule, be at the umbilicus; but if it is evident that the injury was inflicted very high up, it may be advisable to have it an inch or so higher, to facilitate examination of the stomach. The incision should not be made lower, for the attachment of the mesentery may interfere with turning out the intestine, especially if the mesentery is short, or thickened with fat.

The peritoneum should be inspected before it is incised. If there be blood in the cavity it will probably make its presence known through the transparent membrane, but care must be taken not to confound an ecchymosis of the omentum lying under the incision with free blood, and the distinction will not always be easy. It will be possible, also, to ascertain the presence of gas, pus, or even congestion of the peritoneum, in some cases. The peritoneum having been inspected and incised, a sponge on a long forceps is to be passed into the pelvis, and examined on withdrawal for blood, pus, or feces. The same should be done for each lumbar region. It must be remembered that fecal odor is not an absolute proof of the presence of feces, for a fluid in the belly may contract this odor through mere contact with the intestine.

Parkes has already pointed out[1] that simply opening the abdomen will often cause the hemorrhage within it to cease, the contact of the air making the vessels contract, and the blood coagulate more firmly and rapidly. While this is true, especially when the bleeding proceeds from small vessels, the opening of the belly removes from its contents the pressure of the abdominal walls, and in some cases the hemorrhage will increase, instead of diminishing. Thus, in some of the experiments upon dogs, it was observed that the first serious symptoms of loss of blood appeared at the moment when the peritoneal cavity was opened, and the blood gushed from its interior. Dennis[2] suggests that a tourniquet without the pad, or an Esmarch elastic tube be placed around each thigh before the cavity is opened, and kept in place until the bleeding vessels have been secured, in order to save at least the blood contained in the lower extremities.

[1] The Medical News, May 17, 1884, p. 564.
[2] The Medical News, March 6, 1886, p. 254.

In performing laparotomy for internal hemorrhage, every step of the operation should be executed with the greatest rapidity. As soon as the belly has been opened, and a large amount of blood is seen welling up from the bottom, the operator should lift up the omentum, quickly pass his left hand underneath it, upward and backward, and make pressure upon the abdominal aorta and the root of the mesentery, at the highest point which can be reached. The hemorrhage will thus be temporarily controlled. With his other hand, and the aid of his chief assistant, the entire small intestine is to be quickly turned out, the mesentery being inspected as this is done, and any bleeding points seen secured at once with clamps; another assistant wrapping the intestines, as soon as brought out, in towels which have been soaking in a hot 1 to 4000 bichloride solution. The abdominal cavity is to be rapidly emptied of blood and clots, and all bleeding points seized. The pressure upon the aorta may then be gradually relaxed, the operator watching to see if all the injured vessels have been properly secured.

Up to this time stimulants should have been given with caution, so as not to interfere with nature's efforts to stop the hemorrhage, but now they must be pushed with energy, and if the patient is very weak, the salt solution must be prepared for transfusion. All the vessels having been tied with catgut, a more careful examination of the intestine is to be made, to discover any injuries to the gut, or any loops which have been deprived of their blood supply by injuries of the mesentery. Even in the first hurried examination it should be kept in mind that rupture of the gut may be present, and if any are found, the injured loops are to be wrapped in separate cloths, to avoid the danger of spreading the feces over the mass of intestines. In these cases it is probable that the patient will be too low to admit of so prolonged an operation as resection with suture, and it will be necessary to make an artificial anus.

If there were no injury of the gut, the cleansing of the peritoneal cavity, and the inspection and return of the intestine would require but a few minutes, and the abdominal wound having been partly closed by the introduction of a few deep sutures, a flat sponge being left inside as a further precaution, the operator would be at liberty to attend to the transfusion, completing the closure of the wound afterward. Even if the intestine were injured, all, except the injured part, could be returned after inspection and cleansing, the wound temporarily closed as just suggested, and the injured loops kept wrapped up in a warm cloth until the operator had made the transfusion. This early return of the uninjured parts was repeatedly found to have a remarkable effect in improving the pulse in the experiments on dogs, and will prove a very useful expedient when the shock is great; in fact, the intestines should always be returned as soon as the peritoneum has been cleansed.

But if the hemorrhage is not great, the operator should lift up the

omentum, and carefully draw out the intestine, one loop at a time, wrapping the gut in towels as he lays it to one side, until the whole has been examined. It is impossible to make a thorough examination without removing the entire small intestine from the abdomen. Attention should first be given to those parts lying directly under the blow, for this is most frequently the situation of the injured loop. If any injuries are found, if they are extensive, and there is much fecal extravasation from the wound, the injured loops should be wrapped by themselves in a cloth, and kept separate from the rest until the examination has been completed. But if the injuries are of small extent, and there seems to be no fecal extravasation from the wounds, they should be closed at once according to the simple (and yet original) method employed by Bull[1] in the suture of gunshot wounds of the intestine under similar conditions.

The injured loop is carefully laid upon a large flat sponge, and steadied there by an assistant who holds the mesentery and avoids all pressure upon the gut itself, while the operator carefully picks up the wall of the intestine with mouse-tooth forceps and inserts the Lembert sutures, tying each one as soon as inserted. The needle preferred by Dr. Bull is the delicate, curved intestinal needle of Schramm. Fecal extravasation is avoided by the extremely careful handling of the gut, and the edges of the wound remain unsoiled, a great improvement on the ordinary method of removing the feces from the neighborhood of the wound by pressure upon the gut before the sutures are inserted, for it is almost impossible to do this without the escape of a small quantity, and the contamination of the edges of the wound.

All the intestines having been inspected, and all injuries treated at once or laid aside for later treatment, the peritoneal cavity is to be thoroughly cleansed with sponges. If there has been a rupture of the intestine, even if it is very small, and even if there has been no perceptible fecal extravasation, the whole cavity must be flushed with a 1 to 10,000 bichloride, or a 1 to 100 carbolic acid solution, at the temperature of the blood, or warmer. Still better would be plain water which had been kept boiling for at least an hour and then allowed to cool off, or cooled by the addition of cold water which had been previously boiled in the same way. A large quantity of water must be used, the cavity being filled and emptied several times. The warm water will be found to improve the condition of the patient, and, therefore, collapse is no contraindication to this flushing out of the belly.

The cavity having been cleaned, those portions of the intestine which are uninjured, or have been already treated, should also be thoroughly douched with the water, and, if much feces has escaped, should be well scrubbed with sponges. In cleaning the intestine, great care and many

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[1] The author is indebted to Dr. Bull for permission to describe this method.

sponges will be necessary to prevent the fluid from running down the funnel formed by the mesentery, into the belly, which has just been cleaned. All these parts of the intestine can then be returned to the abdomen, only the loops still untreated being kept out. When excessive distention of the gut by gas interferes with its return to the belly, punctures may be made with a coarse aspirating needle, if care is taken to avoid escape of feces, and the punctures are closed by a couple of Lembert sutures to prevent subsequent leakage. If the large intestine be distended, a long flexible tube may be inserted into the rectum, and by manipulation through the walls of the gut it can be easily carried up beyond the sharp bends in the sigmoid flexure which usually impede its advance, and the entire colon thus emptied of gas.

We have seen that there are three varieties of injury to the intestine to be expected, deprivation of blood-supply by injury of the mesentery, contusion or laceration of part of the coats of the gut, and rupture of all the coats for the whole or part of the circumference of the bowel. If the blood supply has been hopelessly destroyed in any part and gangrene is inevitable, that part must be removed. If the injury to the intestine is merely a laceration of part of its coat, or a contusion, suture will be necessary if the laceration involves more than the peritoneum, the injured spot being simply turned into the lumen of the gut and the folds thus made in the wall united over it by the Lembert suture. In these lacerations, the peritoneal, and even the deeper coats, are sometimes stripped off for a considerable extent, and resection of the injured part may be necessary.

The small ruptures will often allow of suture without resection, like bullet-wounds of the gut, the more so, that these ruptures do not often involve the mesenteric border, and hence do not interfere with the blood supply. Of intestinal resection and suture we need not speak further.

It is probable that the creation of an artificial anus will be the operation best suited to most cases of rupture of intestine in contusion of the abdomen. The collapse of the early stages, and the exhaustion later (when it has been impossible to make an early diagnosis) will in the great majority of cases prevent any attempt at such a prolonged operation as resection of the intestine with suture, and the latter should be reserved for the most favorable cases. It will be easy to restore the continuity of the gut at some later time when the patient has recovered from the accident, and the dread of having a permanent fecal fistula need not be allowed to weigh in the decision of the matter.

In making an artificial anus in these cases, both ends of the gut are to be occluded with ligatures or clamps, and as it will not be necessary to empty the gut at once, these may be left in place for twenty-four hours or longer, to allow adhesions to form and granulations to spring up, thus avoiding all danger of infection by escaping feces.

The creation of an artificial anus will greatly shorten the duration of a laparotomy for rupture of the intestine, and should be used in every case in which the patient's strength is doubtful. The operation admits of still greater abbreviation, if the patient is in a desperate condition, by securing the ends of the gut with a clamp or ligature, thoroughly cleaning the peritoneal cavity, passing the deep sutures for the abdominal wound further back from the edge than usual, in order to evert more peritoneum and make a broader peritoneal surface, and trusting to the pressure of these sutures, together with the aid of the clamp or ligature to hold the ends of the gut in place until the adhesions are firm. The entire operation performed in this way ought not to last more than half an hour, and would not be too much to attempt unless evidently fatal collapse had set in.

In performing laparotomy for supposed rupture of the intestine, the surgeon must be prepared to deal with any injury to the other abdominal organs. Rupture of the stomach would be treated on a similar plan to rupture of the gut. Rupture of the bladder would also be amenable to suture. In rupture of the liver, spleen, or kidney, it would be necessary first to control the hemorrhage—by ligature, deep sutures, the cautery, or pressure by a tampon of iodoform gauze. The spleen or kidney could be removed. It is certain that great triumphs await the surgery of the future in the treatment of these formidable injuries.

Undoubtedly in many cases of rupture of the intestine the patient will be too weak to permit of any operation, for it is certainly not justifiable to perform laparotomy when the patient is in collapse. This has already been done too often, as may be seen by the cases reported. Nothing is gained by such operations, and they bring discredit upon the surgeon and his art. If the patient is so feeble that it is impossible to bring about an improvement by the ordinary stimulants, he will certainly not survive laparotomy.

We may sum up the practical results of our inquiry in the following:

CONCLUSIONS.—1. The treatment of contusion of the abdomen should be purely expectant in the early stage, until symptoms of internal injury have appeared, or until the full extent of time in which they may be expected has passed. Explorative laparotomy at this time is inadmissible.

2. When symptoms of uncontrollable internal hemorrhage, or serious visceral injury appear, laparotomy is indicated; but, when the diagnosis is uncertain, the operation should always be begun as an exploration.

3. Great collapse is an absolute contraindication to all operative interference.

4. When rupture of the intestine is found, the best method of treatment is to secure the injured gut in the abdominal wound, and form an artificial anus. This can be easily relieved by a later operation, when the patient has recovered his strength.

ON HEPATIC CIRRHOSIS IN CHILDREN.[1]

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HAVING met with two cases of that rare affection in children, cirrhosis of the liver, I venture to make them the subject of a few observations; not that I hope to remove the obscurity which surrounds the subject, but rather to add to the few examples already recorded two more, in which neither the use of alcohol nor the virus of syphilis can be assigned as the cause of the hepatic cirrhosis.

The infrequency of cirrhosis of the liver in children may be substantiated by a few quotations. Thierfelder[2] speaks " of the absolute rarity of the affection as regards children." Henoch[3] admits that he never found the disease "fully developed in children." Dr. Charles West[4] states that "an experience of 70,000 cases of children's disease had yielded him but four examples of hepatic cirrhosis." The late lamented Flint, in a private letter to me respecting one of the cases about to be reported, dated December, 1884, remarks that " in so young a subject the disease is exceedingly rare." And Neureuter[5] estimates its ratio to other diseases admitted into the Franz Joseph Hospital for children at one-tenth of one per cent.

I will first relate the two cases that have been under my own care.

CASE I.—Miss ——, aged nine years, was brought to me in November, 1878, on account of a few nævoid-looking groups of vessels on the right eyelid, which had formed, her mother thought, since a severe attack of pertussis experienced in the preceding July. On January 27, 1879, my services were again sought, because the child had been " poorly for some weeks." It was subsequently admitted that she had not been well for several months. She had been weak, fretful, nervous, and unable to perform her school-work, and her appetite had failed. Her leading symptoms at this first visit were a subicteroid tint of skin and conjunctiva, and enlarged liver, its lower margin extending an inch and a half below the ribs; the spleen also in the same condition, and its lower end perceptible two inches below the ribs. The upper abdominal zone was very perceptibly enlarged; indeed, her mother had for some time thought the child's waist increased in circumference. Pulse 114; temperature 103⅘° F.; tongue clean; urine of deep orange color; a loose cough, not explained by examination of chest, the organs in which were normal, so far as physical signs could be relied on. Expectoration scanty, semi-transparent, viscid, and pink from the presence of a minute quantity of blood.

[1] Read at the meeting of the Association of American Physicians, Washington, June 2, 1887.
[2] Ziemssen's Cyclopedia, ix. p. 175.   [3] Lectures on Diseases of Children, 1882, p. 232.
[4] Diseases of Infancy and Childhood, 7th ed., p. 654.
[5] Oesterreichisches Jahr. für Paediatrik, 1877, viii

Personal history. Is one of four children; all of whom are living and healthy, except a brother, who died of membranous laryngitis at five. All the four children have had symmetrical, handsome faces and figures, devoid of evidence of rickets, hereditary syphilis, or scrofula. The patient has always been healthy, and made good recoveries from measles, croup, chickenpox, and whooping-cough. She had escaped scarlatina.

Family history. Mother is remarkably healthy and well nourished. Mother's father died of valvular disease; mother's mother of disease of kidney; a maternal uncle of phthisis, and a maternal aunt of laryngeal diphtheria; another maternal aunt died of cerebral embolism from rheumatic valvular disease, a third from puerperal convulsions, and a fourth, three weeks after parturition, from some puerperal inflammation. Three maternal uncles and two aunts are alive, and enjoy good health.

The child's father, a vigorous, healthy man, has not had syphilis, and uses alcohol in moderation. The paternal grandfather had always been healthy, and died in advanced life; the paternal grandmother died when comparatively young, the cause of her death is not known; all the other members of father's immediate family, viz., a brother and two sisters, are living and healthy.

It would occupy too much time to report the daily notes, and the leading facts must suffice.

A febrile temperature prevailed throughout the four months that the child lived after coming under observation. During the first four days of February it was 104°, and for the rest of the month it ranged between 101° and 100°. The average daily temperature for the first fourteen days of March was 100.7°, and for the remainder of the month about 99.4°. For the first week of April the temperature ranged between 101° and 100.5°, for the second week between 100° and 99°, and for the rest of the month between 100° and 98½°, although it was but three times below 99°. For the first half of May it ranged between 100° and 101°; during the last ten days of the patient's life the temperature was not recorded.

Epistaxis was frequently present throughout the illness, in moderate amount, yet sufficient to soil three handkerchiefs a day. It had occurred, however, very often since the attack of whooping-cough in July.

Hemorrhage from the kidneys was also a persistent symptom after its first appearance on February 25th. The urine was rarely free from blood after that date, but the removal of the pressure of the ascitic fluid by tapping was followed by a temporary sensible reduction in the proportion of blood contained in the urine.

In the early part of February pain of the character of "bellyache" was experienced in the umbilical region for one day, but it was unaccompanied by tenderness on pressure. Pain in the splenic region was complained of for three days before the first tapping, which was performed on April 7th. It did not recur in that region for three weeks, at which time the belly was rapidly refilling. But the night succeeding the first tapping, pain occurred in the right side of abdomen, and persisted for the four succeeding days; yet it was unaccompanied by tenderness, or a higher temperature than had immediately preceded the paracentesis, and the ascitic fluid was found to be transparent even after the third tapping, which became necessary a fortnight after the second.

From these facts it may be concluded that the turbid serum and recent

lymph found in the peritoneal cavity after death, were the products of a latent peritonitis which succeeded the last paracentesis.

Perceptible enlargement of a few veins in the epigastric zone, was noted on February 10th; by May 3d many large mammary veins were found inosculating with these; and by May 17th the thoracic and abdominal parietes were covered by numerous large veins, suggestive of the serious obstruction that existed in the portal system.

Ascites was first noted on March 4th. It resisted digitalis, squill, cream of tartar, potassium iodide, and an occasional cathartic or an active diaphoretic; and tapping became necessary on April 7th, when nine pints of transparent citron-colored serum were removed. The operation was repeated on April 21st, and, for the third time, on May 4th, upon which occasion eleven pints were evacuated.

A reduction in the size of the spleen was noticed after iced compresses had been applied over the organ three times a day for thirty to forty minutes at a time, but a month afterward the organ had regained its former size.

On the 26th of February, the day after the first occurrence of hæmaturia, the *urine* had a sp. gr. of 1.022, and a smoky appearance, but no marked sediment. It contained about one-third by volume of albumen, many leucocytes and blood-corpuscles, very few highly granular hyaline casts, and in the same field a single waxy and a single epithelial cast. The urine of the 5th of May had a sp. gr. of 1.014; it contained only one-twentieth of its volume of albumen. Numerous blood globules, several large epithelial cells containing numerous fat globules and a single hyaline cast, were seen in one field.

On the 10th of April my friend, Dr. Osler, counted the blood-corpuscles and reported 2,400,000 red per cubic millimetre, and 1 white to 144 red. Six days later, with the same proportion of red corpuscles, the ratio of the white to the red was 1 to 91. From the report of the latter date the following memorandum is taken: "Nothing of special note about the corpuscles—red natural, of uniform size; no microcytes. Whites of natural appearance; very little variation in size; no nucleated red corpuscles."

On the 12th of March a troublesome dry cough set in, accompanied by fine bubbling in the bases of the lungs without the whistling rhonchi of bronchitis. About the same time a moderate general puffiness of hands, feet, and legs appeared, symptoms which, when taken in connection with the character of the urine a fortnight before, probably indicated a renal source. The state of the kidneys after death favors this view. During the last eight or nine days of life grave disturbance of the nervous centres occurred; delirium, ravenous appetite, tearing of bedclothes, a soporose passing into an unconscious state. Next day recovery of consciousness, involuntary evacuations, reticence or actual inability to speak (not established which), extremely dilated pupils, twitchings. Then a half-conscious condition attended with monotonous expression, general restlessness, and moaning. Death took place on the 23d of May, four months from the time that she came under treatment.

Autopsy made next day by Prof. Osler. Eleven pints of turbid serum with flocculi of recent lymph in peritoneal cavity. Adhesion of great omentum to intestines. Parietal peritoneum thick and granular-looking, chiefly in the upper abdominal zone and on the diaphragm.

Spleen about three times normal size; capsule thickened; texture

tough, resisted the knife. Liver, right lobe adherent by thick layer of imperfectly organized lymph to under surface of diaphragm. The organ was large and thick; very granular; tough, resisting the knife; of a dirty white color; very anæmic—fine specimen of hypertrophic cirrhosis. The new fibrous tissue extended throughout the entire organ and appeared to be " mono-lobular." Gall-bladder contained a little clear citron-colored fluid. No gall-stones or obstruction of the biliary ducts.

A laminated colorless coagulum within vena porta and loosely attached to its lining membrane. Stomach, suprarenal capsules, intestines, and bladder normal.

Kidneys large and deeply congested; cut surface coarse; capsuleeasily torn off; a moderate serous effusion into right pleura; a fine granular exudation over pleura covering lower lobe of right lung; some clusters of gray tubercle in the upper lobe of both lungs; a caseous nodule size of dried pea in left upper lobe, and a caseating bronchial gland at root of right lung. Heart, brain, and cord not examined.

Case II. occurred six years after the first, in the brother of the little girl whose history has just been read.

He appears to have had in previous years the same diseases as his sister, and like her to have escaped scarlatina. Some two years before the detection of the illness about to be described, this boy, then eight years old, was brought to me by his mother as he looked pale, appeared not to be thriving, and she feared that he might be the subject of the same affection as his deceased sister. Nothing definitely wrong was discovered at the time by me, nor, a few months later, by another physician; but the child improved while taking lactopeptin. In May, 1884, he was seen by me on account of a slight herpes circinatus, and his health appeared to be good at the time. The summer months were spent at the seaside, where he underwent a good deal of fatigue without apparent ill effect. For a fortnight after returning home he appeared to be in good health, but at the end of that period he became languid and unfit for work or play. I was then (12th of September, 1884) requested to see the child, and noted the following: subicteroid hue of skin and of the conjunctivæ; urine deeply bile-tinged; stools contained bile; waist appeared enlarged and epigastric zone prominent. Hepatic dulness extended from fifth space to over a couple of inches below the margin of ribs in the nipple line and well down into the epigastrium in the median line. The splenic dulness also much increased. Two small patches of enlarged venules under left eye and one upon side of the neck were present and of a bright red color, and exactly like those observed on his sister. No enlarged lymphatic glands, although twelve or eighteen months before a single gland in one groin was somewhat hypertrophied.

As in the first case, a febrile temperature was present. During the first month it ranged between $99\frac{2}{5}°$ F. and $100\frac{2}{5}°$ F., and during the second between $100°$ and $101°$ in the forenoon. It did not exceed the latter point at any time beyond half a degree.

The pulse-rate was lower than in the firs case. It did not pass 90 till the middle of October. It gradually rose to 104 in the succeeding month, and reached 108 to 110 during the last week of life.

The liver and spleen enlarged rapidly, and in a month from the first examination their lower borders reached the horizontal level of the umbilicus. As in the previous case, the dimensions of the spleen subsequently became reduced, so that after the first tapping its lower border

was only about on a line with the margin of the left hypochondrium. It was found, however, an inch lower nine days later, after the second tapping.   The liver also suffered a reduction in volume; for by the 5th of December its lower edge was only two inches below the margin of the hypochondrium, instead of reaching to the level of the umbilicus.

Epistaxis set in early in September and recurred several times, but only in small quantities.   Hæmaturia was not observed, and only once, on the 19th of December, did blood appear in the vomited matters, and then the amount was trifling.   Jaundice was present when the child first came under my care, and deepened with the advance of the case.   The urine was always deeply bile-stained, but the stools were never devoid of bile.

The blood was examined but once (the 11th of October).   It contained no excess of white corpuscles and was of a deep red color.

The existence of ascites was established on the 26th of November, and it increased so rapidly that the fluid required to be drawn off on the 6th of December, when five pints of transparent citron-colored serum were evacuated by means of an aspirator.   A second tapping became necessary nine days after the first.   The fluid had its former character.

Œdema appeared in the feet and legs on the 12th of December, and reached the scrotum and lower part of trunk on the 14th.   The distention of the scrotum became so considerable that on the 19th three or four needle punctures were made and the œdema permanently relieved thereby.

Numerous large veins, branches of the epigastric and mammary, were present in November, but they did not attain in either number or size the proportions observed in the previous case.

Pain, chiefly in the epigastrium and over the splenic region was first complained of on November 22d; it was unaccompanied by tenderness on pressure.   It persisted about eight days and was very severe on the 30th of that month.   After that the child frequently complained of pain in the belly which at the time I attributed to the distention of the abdomen.

On the 21st of December a peculiar delirium, attended by screaming and violent shaking of the hands, set in, and lasted about three hours. The same thing occurred on the 23d, and early on the 24th, and lasted about the same time.   Coma supervened at 10 A. M. of the 24th.   The respiration was slightly stertorous, with flapping of the cheeks; the pupils were widely dilated, but contracted on first exposure to light and then became as large as before.   There were frequent tetanic spasms of the extensors fixing the forearm in rigid extension; rigidity of the lower limbs, the feet being rigidly extended upon the legs, and occasionally twitching of the eyelids.   Death took place at 2 P. M., four hours after the advent of the coma.

Autopsy, twenty-five hours after death; cold weather. No cadaveric rigidity. Icteroid hue of general integument. Five pints of orange-colored transparent serum, devoid of lymph flakes, in peritoneal cavity.   No signs of acute or chronic peritonitis.   Liver, two and a half pounds, enlarged; left lobe very broad vertically, right lobe also large and its posterior border very thick, the edges of anterior border thin; no adhesions of liver to adjacent parts.   Its surface everywhere presented the typical "hob-nail" appearance.   A shallow depression, about equal in area to that of a man's palm, was seen about the centre of

its convex surface and the granulations over this depression were very closely set. The substance was dense, resisted cutting very markedly, and was of a deep yellow color. Gall-bladder full of bile but not over distended. No gall stones present. Common duct pervious.

Spleen enlarged three or four times its proper size, not adherent to adjacent structures, and like the liver, free from opaque or thickened patches on its exterior. Substance firm, cut surface coarse-looking and exhibiting some dark, purple areas. The peritoneum and exterior of intestines normal. Right lung not consolidated. Left lung, kidneys, heart, and brain not examined. My notes of the autopsy contain no mention of tubercle in the right lung; had any been present I doubtless would have recorded their presence.

Dr. Wyatt Johnston, Demonstrator of Pathology in McGill University, has kindly given the following summary of the microscopical appearances of this liver. "The fibrous tissue is seen to be developed in connection with the portal system and surrounds the acini, which vary greatly in size and are nowhere very large. Where the fibrous tissue penetrates the acini it does so as a considerable bundle and not in fine intercellular filaments. The centres of lobules are free from fibrous tissue; central veins not dilated; bile ducts look natural. In the liver cells the nuclei do not stain deeply. This is owing, no doubt, to the long maceration in weak spirit, and to the same fact is probably due the apparent absence of small, embryonic, fibrous tissue cells at the border of the fibrous tissue."

Before making a few observations on the subject of cirrhosis of the liver it may be well to say that by that term is meant, in this paper, a diffuse development of the connective tissue of the liver without reference to the question of the inflammatory or the simple hypertrophic nature of that development. The word interstitial hepatitis is employed as synonymous with hepatic cirrhosis.

The known conditions in the human subject under which interstitial hepatitis occurs are somewhat numerous and may be thus classified or grouped:

1. Toxic or irritating substances entering the blood; (a) especially alcohol, (b) syphilitic virus, (c) malaria, (d) probably, but rarely, lithic acid when productive of the lithic acid or gouty dyscrasia,[1] (e) blood pigment in diabetes.[2]

2. Chronic congestion of the hepatic vein, as in valvular and pulmonary diseases, and in those rare affections of which I have seen examples, obstruction or obliteration of the hepatic veins, or of the inferior vena cava above entrance of the hepatic vein.

3. Adhesive inflammation of the portal vein (pylephlebitis), especially the syphilitic variety, three cases of which I have found reported.

[1] Thierfelder doubts this, but Murchison maintains it from his own observation : Diseases of Liver, 3d ed., p. 636, 1885.

[2] Hanot: Arch. de Phys. Normal et Path., Paris, 3 s. vii. 50–87, and Latulle : No. 20, Bull. et Mem. de la Soc. Méd. des Hôpitaux.

4. Extension of inflammation to the interstitial tissue of the liver in chronic peritonitis, and in perihepatitis.

5. Obstruction of bile ducts, whether from congenital defects (absence of common duct) or from post-congenital disease (tumors, gall-stones, or experiment ligatures).

6. In association with tubercular disease, more especially of the lungs.

7. As part of a general tendency to new formation or hypertrophy of connective tissue in the system, the so-called fibroid diathesis.

I have not had time or opportunity to institute a very extensive search into the literature of the subject, but have collected sixty-one cases of cirrhosis of the liver in children up to the age of puberty, which, with two personal cases, give an aggregate of sixty-three.

It seemed to me best thus to limit the age rather than include cases even of young adults, for in the latter the influence of alcohol would probably be found to be a dominant one as it is in persons of middle age. I have also excluded cases of hepatic cirrhosis due to congenital defects of the biliary ducts. Confining our attention for the present to the *causative* relations of these sixty-three cases, some interesting facts are brought out.

In the first place, the above mentioned conditions under which cirrhosis of the liver is known to occur were alleged to be present in but thirty out of the sixty-three cases, leaving over one-half of these to be accounted for.

1. The ordinary cause of the disease in adults, the excessive use of alcohol, existed in only 10 of these cases of cirrhosis in children. Its absence was noted 47 times, and no mention was made of it in 6 cases.

2. A heredito-syphilitic origin obtained in 7 cases, the cirrhosis existing at birth in all but one, a boy sixteen years of age. One of these children was born in the thirtieth week of gestation, and another in the thirty-fourth week. The absence of syphilitic causation was affirmed in 29 cases, and no mention was made of it in 30 cases.

3. In 3 of the syphilitic cases the virus set up an adhesive peripylephlebitis which terminated in a diffuse interstitial hepatitis, and these are the only instances in the whole number of cases of hepatic cirrhosis in children in which adhesive inflammation of the portal vein was the starting point of the process.

4. Venous congestion of the liver, a not infrequent factor in the production of cirrhosis in the adult, existed in but a solitary case. The condition present, obliteration of the hepatic vein close to the vena cava, is exceedingly rare at all periods of life. I have seen one example of it.

5. The lithic acid diathesis is not once mentioned as having been present in these cases; and

6. The same is true of malaria and ague. The absence of malarial influence, however, is only affirmed seven times; it may often have been overlooked.

7. In a single case the existence of widespread false membrane in all parts of the abdomen and a complete envelope of it enclosing the liver, suggest that peritonitis may have extended to the capsule of the liver and excited the interstitial hepatitis. In another case there were numerous adhesions between the liver and surrounding parts, but no general peritonitis.

8. The association of hepatic cirrhosis with tuberculous disease obtained in 7 of these collected cases, perhaps in 8; about the same proportion as that in which cirrhosis and syphilis were coexistent.

9. There are recorded examples in the adult of the existence of cirrhosis of the liver along with a tendency to a condition of general fibrosis in the system.

In two cases, two organs, the liver and kidneys, were cirrhosed; and in two, three organs had undergone chronic interstitial fibroid alterations. Thus, in one the child had taken a great deal of wine between meals and the liver was typically cirrhosed, the spleen large and firm, and the mucous membrane of the stomach thickened. Again, a girl of thirteen, without a history of intemperance, had, together with extreme hepatic cirrhosis, evidences of old double pleurisy and old peritonitis. Another is that of an infant that died at birth, free from a syphilitic history, in which Virchow found cirrhotic changes in the liver, spleen, and kidneys coexisting with peritonitis. But the most striking instance of a general tendency to overgrowth of connective tissue is afforded by the case of a girl aged six, who occasionally "took beer at dinner, but did not like it," and in whom, in addition to cirrhosis of the liver, there was hypertrophy of the connective tissue, and an infiltration of small round cells in the spleen, kidneys, stomach, heart, and brain. The walls of the bloodvessels in all the organs were also thicker than natural.

In only six then of the fifty-seven examples of non-syphilitic cirrhosis of the liver in children, omitting those in which the liver and spleen, but no third organ, had undergone cirrhotic changes, can it be said that the hepatic cirrhosis was the outcome of a general tendency of the system to fibrosis; and in only one of them was found such a thickening of the walls of the bloodvessels as would justify the application of Gull and Sutton's theory of an arterio-capillary fibrosis as the source of hepatic cirrhosis, at least in children. It is, however, to be borne in mind, that the condition of the vascular system has very probably not often been investigated in this affection in childhood.

The instances in which a firm or tough condition of the spleen occurred in association with cirrhosis of the liver, other organs escaping such alterations, have not been included in the above illustrations of a

more or less general tendency to fibrosis, because the splenic alterations are reasonably explicable upon other grounds, such as habitual over-stimulation of the spleen by passive congestion of its structure with portal blood, the blood, moreover, probably containing products irritating to that viscus.   But it is only right to say that in thirteen instances, along with the hepatic cirrhosis, the spleen was found large and firm; and in two instances tough.   In eight instances it is simply called "large," and in one "large and soft."   It may be said that in twenty-four of the fifty-seven cases of the non-syphilitic group the spleen was abnormal.

Assuming that we have so far determined the causative relation of about one-half of these sixty odd cases of hepatic cirrhosis in children, what about the other half?   Before attempting an answer to this question it will be well to recall the fact that in addition to the above mentioned well-established conditions under which interstitial hepatitis occurs, there are others which have been suggested, but which need much investigation and corroboration before they can be accepted as proven, however probable they may appear both from analogy and fact. George Budd,[1] over forty years ago, suggested that "there may be other substances among the immense variety of matters taken into the stomach, or among the products of faulty digestion, which, on being absorbed into the portal blood, cause, like alcohol, adhesive inflammation of the liver."   Much more recently, in 1872, Botkin[2] advanced the hypothesis, that the acute infectious diseases may originate chronic inflammatory processes in the parenchymatous organs, because he had found in a number of cases commencing interstitial inflammation of the liver in persons dying of cholera or of typhoid fever.   And Klein, in 1877,[3] described an acute interstitial hepatitis as present in eight cases of scarlatina which he had examined.

Now, although, so far as I am aware, no instance has been recorded in which cirrhosis of the liver was shown to be a *direct* sequence of scarlatina, cholera, or typhoid fever, yet, as it is established that in the kidney the poison of scarlet fever does frequently set up acute inflammation of the parenchyma and interstitial tissue which often becomes chronic, why may not the liver occasionally suffer a similar chronic inflammatory process? and what support is afforded to that view by this collection of cases?   An analysis of the thirty-eight instances of cirrhosis of the liver contained in these tables, which cannot be referred to any of the established causes of that affection, shows that in nine instances the following acute infectious diseases preceded by a longer or shorter interval the cirrhosis; viz., scarlatina twice, measles and scarla-

[1] Diseases of Liver, 1845.   [2] Quoted by Thierfelder in Ziemssen's Cyclop., ix.
[3] Path. Soc. Trans., xxviii. 439.

tina once, measles alone four times, measles and pertussis thrice.   In twenty-five instances no mention is made of acute infectious diseases as antecedent to the cirrhosis, and they were absent in three.   The relative frequency of measles and of scarlatina in the above-mentioned nine cases was as 8 to 3 ; rickets once preceded the cirrhosis.

When the frequency with which the acute infectious diseases occur in childhood is borne in mind, it is plain that the above statements cannot be said to establish Botkin's hypothesis.   Certainly, the infrequency with which hepatic cirrhosis obtains in children who have gone through the common infectious fevers is quite in contrast to the comparative frequency with which chronic nephritis follows scarlatina, and we need much stronger evidence than has been adduced to prove that the acute infectious fevers are causes of hepatic cirrhosis in children.   However, an exception is admitted as already mentioned, in favor of intermittent fever or of malaria.

Even if it be granted that in the nine cases in which acute infectious fevers did precede the hepatic cirrhosis they really originated the interstitial lesion, there remain three in which those fevers had not occurred, and twenty-five in which no mention is made of them as having existed. For such examples of hepatic cirrhosis Budd's explanation is available and appears highly probable.   Indeed, it is more especially in childhood when alcohol, as a cause of hepatic cirrhosis, can be, in a large proportion of cases, safely ignored, that we feel disposed to accept the view that the products of faulty digestion and certain stimulating kinds of food conveyed to the liver, set up interstitial hepatitis.   It is well known that many of the lower animals (cow, pig, horse, deer, etc.) are subjects of hepatic cirrhosis.   The fawns at Guy's Hospital to which the students from time to time gave linseed meal as a *bonne bouche*, died of cirrhosis of the liver.

It is impossible to bring much evidence in favor of this mode of causation from the cases that we are analyzing, owing to the absence of information as to the habits, diet, etc., of the patients.   In the two cases observed by myself, the children habitually partook of the same kind of food as their parents, and that was at least of a stimulating character for children, the family being noted for the excellence of their cuisine.

Besides food containing articles more or less irritating to the liver, besides new products from faulty digestion, there is a class of bodies which were hardly known when Budd wrote his article, that may play a part in the production of interstitial hepatitis—such are the alkaloidal products of albuminous decomposition which have of late years been receiving attention—the ptomaines.   Some of these may be the initiating cause of interstitial hepatitis.   This subject has not as yet received much attention.

The age at which cirrhosis of the liver occurred in these children was

at birth	.	.	.	.	.	. 1	⎫
" 3 months	.	.	.	.	. 1		
" 17 "	.	.	.	.	. 2		
" 20 "	.	.	.	.	. 1		under 3⅓ years, 10
" 2 years	.	.	.	.	. 1		
" 3 "	.	.	.	.	. 2		
" 3½ "	.	.	.	.	. 2	⎭

" 5 "	.	.	.	.	. 4	⎫
" 5½ "	.	.	.	.	. 1	
" 6 "	.	.	.	.	. 2	5 to 8 inclusive, 13
" 7 "	.	.	.	.	. 3	
" 8 "	.	.	.	.	. 2	
" 8½ "	.	.	.	.	. 1	⎭

" 9 "	.	.	.	.	. 5	⎫
" 10 "	.	.	.	.	. 7	
" 11 "	.	.	.	.	. 7	9 to 13 inclusive, 28
" 12 "	.	.	.	.	. 5	
" 13 "	.	.	.	.	. 4	⎭

" 14 "	.	.	.	.	. 1	⎫
" 15 "	.	.	.	.	. 1	14 to 18 inclusive, 3
" 18 "	.	.	.	.	. 1	⎭
Not stated .	.	.	.	.	. 2	

56

According to this analysis the greatest liability in childhood to hepatic cirrhosis is from the ninth to the 12th year inclusive.

As regards sex, there were 35 males, 17 females, and in 4 other cases the sex was not stated. (The syphilitic cases are not included.)

Referring to the character of the cirrhosis in these 56 non-syphilitic cases, the atrophic form obtained in 19, the hypertrophic in 13; in 6 the organ was of its normal size; in 16 this point is not mentioned, and in 2 instances the patient was yet living when reported upon.

The symptoms of hepatic cirrhosis in children are identically those of the disease in the adult. I shall speak very briefly upon a few of them. In the two examples seen by the writer, there were present on the face stigmata composed of collections of dilated minute venules. Although they have been spoken of by some few authors, they are rarely alluded to in systematic descriptions of cirrhosis, and are mentioned but once in the records of the other cases, 61 in number, which I have collected and studied. Their presence should suggest an examination of the liver with special reference to the probable existence of cirrhosis.

The opinion commonly held by the profession is that cirrhosis of the liver is a non-febrile disease, yet in 10 out of 52 cases, uncomplicated by

other affections that might produce pyrexia, cirrhosis was associated with fever; that is, in 19.2 per centum.   The same association obtained in 5 other instances in which either simple or tuberculous inflammation complicated the cirrhosis and may have produced the pyrexia.   Dr. R. E. Carrington,[1] who has recently drawn attention to this circumstance, found an irregular febrile temperature present in 18 out of 44 cases of cirrhosis, or in 43 per cent.   (This list includes seven children's cases.) It would not, however, be safe to conclude from these figures that cirrhosis is less frequently associated with a febrile temperature in children than in adults; for the records of many of these are altogether devoid of details on this point.   Of these 10 febrile cases of uncomplicated cirrhosis, 4 presented the hypertrophic form, 4 the atrophic, and 2 had normal sized livers.

In the 56 cases of non-syphilitic cirrhosis, ascites existed in 34; it was absent in 8, and it was not mentioned in 14.   It is interesting to note that in the 13 instances of hypertrophic cirrhosis ascites was absent but twice, not mentioned twice, and present, contrary to the opinions of some authors, 9 times.   On the other hand, abdominal dropsy was absent in 4 out of 19 instances of atrophic cirrhosis, in which it is thought to be rarely wanting, present in 14, and not mentioned in 5 cases.

Icterus, more or less deep, was present in 23 cases, absent in 12, and not mentioned in 21 of the non-syphilitic group.   These cases do not confirm Fagge's statement that where cirrhosis is associated with jaundice the liver is not contracted, as a rule, but is increased in size.   For in the 13 hypertrophic examples jaundice was present 7 times, absent 3 times, and not mentioned 3 times; while in the 19 atrophic examples it was present 10 times, absent 4 times, and not mentioned 5 times.   In other words, icterus coexisted with the hypertrophic form in 70 per cent., and with the atrophic in 71.4 per cent.

One point more and I have done.   The fatal issue of hepatic cirrhosis in children is brought about in many different ways; but there are three especially frequent, viz., by toxæmia, or certain disturbances of the nervous system, by peritonitis, and by asthenia, in the production of which hemorrhage plays an important *rôle*.   These three modes of termination obtained respectively in 12, 9, and 8 instances.   Pneumonia seems to have been the immediate cause in 3 instances.   The following affections held the same relation respectively in one instance : pleuritis, pulmonary congestion, tuberculous meningitis, ulceration of the entire colon, and " diarrhœa, with fits."

The toxæmic symptoms in these children, the subjects of hepatic cirrhosis, have been more especially violent fits of crying, and frequently of screaming, delirium, dilated pupils, stupor, tremor, twitchings, clonic

or tetanic convulsions, rigidity, coma and hemorrhages from stomach, nose, intestines, or kidneys.

In conclusion, it results from this analysis of these 63 cases of hepatic cirrhosis in children—

1st. That most of the established causes of the disease in adults obtain also in children, more especially the use of alcohol, present in 15.8 per cent. of the whole number; syphilis, chiefly hereditary syphilis, present in 11 per cent; tuberculous disease of other organs than the liver, in 11 per cent.; also, but much less frequently than these, venous congestion of the liver, peritonitis, and a general tendency to connective tissue formation in the system.

2d. That syphilis occasionally tends to a diffuse interstitial hepatitis or cirrhosis, by first inducing an adhesive inflammation of the portal vein.

3d. That a general arterio-capillary fibrosis is not proved by these cases to be the usual, and probably not even a frequent, cause of hepatic cirrhosis in childhood.

4th. That more than half of the cases of hepatic cirrhosis in children do not appear to be produced by the above-mentioned well-established causes of that affection.

5th. That there is some evidence that cirrhosis of the liver may be very exceptionally induced by the acute infectious diseases—cholera, typhoid fever, measles, scarlatina, but that proof of this is wanting.

6th. That the habitual use of a stimulating diet, or the absorption of the products of faulty digestion, are probably fruitful sources of hepatic cirrhosis in children.

7th. That it is in harmony with what is known of the causes of hepatic cirrhosis to believe that the bodies known as ptomaines may be capable of exciting a cirrhotic condition, and that investigation of this subject deserves attention.

8th. That the period of childhood most liable to cirrhosis of the liver is from the ninth to the fifteenth year inclusive, but that it may be congenital and may occur at any age after birth.

9th. That it is twice as frequent in male children as in female.

10th. That its symptoms are essentially the same in childhood as adult life.

11th. That it is frequently accompanied by pyrexia.

12th. That ascites or icterus, and frequently both together, are of common occurrence in the atrophic and the hypertrophic forms.

13th. That the group of symptoms which have been referred to cholæmia or to cholesteræmia or to acholia, and even sometimes to uræmia, frequently ushers in the fatal issue of hepatic cirrhosis in children.

NOTE.—The author regrets not having had the opportunity of seeing a valuable article on "Infantile Cirrhosis," published by M. le Dr. P.

Laure et M. Honorat, in the March (1887) number of the *Revue Men-suelle des Maladies de l'Enfance,* before having written this paper, as the French communication contains some original cases, as well as others published by previous writers, the works of some of whom he had been unable to consult, and of others he had overlooked. Dr. E. F. Marsh's case,[1] and Dr. Wesley M. Carpenter's comments[2] upon it, also escaped the author's notice. Dr. Carpenter has specimens of cirrhosis of the liver from children of four and seven years of age.

ON THE THERAPEUTIC ACTION OF THE SULPHATE OF SPARTEIN.

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Fick and Raymond, the first experimenters on the action of spar-tein, one of the two principles contained in the broom, concluded that it acted chiefly on the nervous system. Sée,[3] in 1883, advocated its use as a therapeutic agent in cardiac diseases; stating that it strengthened the pulse as energetically as digitalis; that it was the best known regulator of the cardiac rhythms; that it quickens the heart's action in grave atonic conditions; that its effects are apparent in an hour or so after its administration, and last three or four days after it has been discon-tinued.

Laborde[4] and Legris confirmed the above views, stating also that spartein quickened a slow, but retarded an unduly fast pulse, and that the dose was from one and a half to three and three-quarters grains daily. These observers found that in animals the heart's beat was strengthened and slowed, and the quantity of urine increased. One and a half grains did not injure a dog of sixteen to eighteen pounds weight, but a dose of thrice this amount caused a tetaniform condition, with death from respiratory paralysis, the heart continuing to beat regularly. In the frog the heart continued to beat an unusually long time after death. They were inclined to think that the effect on the heart is produced partly by stimulation of the cardiac muscle, partly by stimulation of nervous centres.

Dr. Hans Voight[5] found that in small doses sulphate of spartein increases the energy of the cardiac contractions, and raises the arterial tension, with a corresponding diuretic action. At first respiration is

[1] Vide The Medical Record, N. Y., Dec. 19, 1885, p. 84.   [2] Ibid., Jan. 16, 1886, p. 66.
[3] Gaz. Hebdom., Nov. 1885, quoted in Med. Chron., Sept. 1886.
[4] Compt. Rendus Soc. de Biol., 1885, ii. 690, quoted in Med Chron., Sept. 1886.
[5] Centralblatt f. d. gesammt. Therap., Oct. 1886.

increased, but afterward somewhat lessened in frequency. There is often a slight narcotic action. Symptoms of intoxication, such as dizziness, headache, palpitation, and nausea, seldom occur after small doses (one-sixteenth to one-quarter of a grain), and pass off during the continued administration of the drug.

Gluzinski[1] found that the main effect of spartein consists, in a slowing of the heart's action, and in raising of the blood pressure more marked in cold-blooded animals. In mammals he distinguishes a first and third period of action, in which retardation is more marked than in the second period, when acceleration may even take place, and explains these phenomena by variations in the irritability of the pneumogastrics and of the cardiac muscle. Reflexes at first increased are subsequently lowered. Death occurs from asphyxia depending upon a lesion, not only of the medulla oblongata, but also of the respiratory muscles. He considers spartein inferior to digitalis in energy of action, but superior in rapidity.

The following observations were made on patients at the same time of the day in all cases, and with regard to meals and other circumstances, as far as possible, under the same conditions. For the tracings a Dudgeon's sphygmograph, that had been selected from several, and had been found previously to give accurate tracings, was used; and as the personal equation is no unimportant factor in sphygmographic tracings, I may, perhaps, say that I had had an extensive experience in taking them before. For the quantity of the urine, since these observations were made on out-patients, I had to depend on their statements, and therefore the most intelligent of the patients were selected for this purpose, especially in those cases in which the amount of urine was estimated.

The most important actions of spartein are to strengthen the cardiac beats, to raise the arterial tension, and to regulate the pulse, and its action appears to differ in some respects according to the dose given. When given by the mouth the first beneficial effects begin to be apparent in nearly all cases about thirty minutes after it has been swallowed, in some not till forty-five minutes after. The effect of individual doses (one-sixteenth to one-quarter of a grain) lasts for about four or five hours, of larger doses (one to two grains) somewhat longer, and gradually pass off. When it has been taken regularly for some days or weeks the effect lasts from three to four days, or even six days after its administration has been discontinued in cases that are not permanently relieved. In a few of the cases given below, the effect, from reasons I could not discover, was not so protracted, passing off with the discontinuance of this remedy. The doses employed varied from one-sixteenth of a grain every four hours

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[1] Fezegad de karski, No. 1, 1887, and Vratch, No. 3, 1887.

to twelve grains in the twenty-four hours, no toxic effects of even the slightest severity were produced, and there was no evidence of accumution in cases where the remedy was taken for from three to four months continuously.

The first effect, coming on about thirty minutes after exhibition of the dose, consists in a strengthening of the force of the heart-beats, with a slowing and regulation of the pulse in cases where this is abnormally rapid. Closely following on this, at about forty-five minutes or one hour after the dose, the arterial tension is raised, and shortly before this rise of tension, or at the same time, the surface of the skin becomes red, flushed, and moist, with, in some instances, free perspiration. During the next two or three hours, for the first part of the time, the surface of the body remains flushed and warm, the arterial tension continues to rise, or to remain at a higher level than before the dose, and the rate of the pulse to be slowed until it reaches or approaches the normal, while from the first the heart beats with increased force; the patient, meanwhile experiences a marked sense of well-being and of comfortable warmth, with, if it existed, loss of præcordial distress, irregular cardiac action, and dyspnœa. Now it seems to me that this rise of arterial pressure, with increased amount of blood sent through the skin (and kidneys), can only be explained in one way, by a special action of spartein on the medullar vasomotor centre, this centre by causing contraction of the vessels of the splanchnic area, and so diminishing the amount of blood sent through the great splanchnic vessels raises the blood-pressure, and, at the same time, an increased amount of blood is driven through the vessels of the skin and kidneys. This increased cutaneous blood-supply will be sufficient to explain the moistening of the skin that takes place, but where free sweating occurs, I think, we must also suppose a stimulation of the secreting cells of the sweat-glands by the drug.

Spartein also causes a variable increase in the amount of the urinary secretions, with increased excretion of urea, in correspondence with the increase of water, and this diuretic action we should anticipate as a consequence of the strengthened *vis a tergo*, the rise of blood-pressure, and the increased quantity of blood passing through the kidneys. This flushing of the surface was a constant result, except in a few cases. On respiration spartein produces an initial quickening, followed by a slowing, reaching or approaching to the normal rate, at the same time the respiratory movements are of greater depth.

Now some minor modifications of the above statements require notice. First, as in Gluzinski's observations, quoted above, in some cases the division of the action of spartein into three periods, an intial, and later one, of slowing of the pulse and respiration, with an intermediate period of quickening, was noticed; this effect occurred about seventy-five to

ninety minutes after the dose was taken, and in only two or three patients; it was especially marked in a case of aortic regurgitation.

Secondly, the best results, in all respects, were obtained when the dose was given often; every four hours appeared the most satisfactory arrangement. Then small and large doses have a somewhat different effect, and this explains some of the discrepancies in the statements of the observers above quoted. Small doses, one-sixteenth to one-twelfth of a grain, produce the maximum effect in the regulation of the pulse. In one instance doses of one-tenth of a grain rendered a previously arhythmic pulse quite regular when large doses had failed to do so, and I had frequent occasion to note the same result. These small doses were also best for relieving palpitation, and for quieting down violent cardiac pulsation; small amounts also appeared to strengthen the force of the heart-beats, with very little raising of the arterial tension, and the stimulating cardiac action, combined with small increase of tension, will be doubtless of great service where it is important to strengthen the force of the heart-beats without increasing markedly the peripheral resistance. Larger doses, one to two grains, powerfully increase the force of the beats, but, at the same time, even more powerfully raise the arterial tension, and as an effect of this I found, in many cases, violent pulsation produced, with præcordial pain, and a strong but very tense pulse.

When the drug is taken regularly for some time, the general effect, apart from that of each individual dose, is found often to be an acceleration of the pulse and respiration-rate, giving way, after the first day or days, to a subsequent slowing.

As to accumulation, an overdose, taken for some time, appears to produce very high tension of the pulse, and, as in the case of mitral stenosis, "tightness of the chest," with sharp cutting pains and throbbing over the heart; in another case, after spartein had been taken for two months continuously, the previously rapid pulse was slowed to fifty beats in the minute; but this was in an elderly man, and accompanied by a sense of increased strength and well-being, with relief of dyspnœa, etc. These were the only two cases in which I could at all obtain any evidence, although I was constantly on the lookout for it, of toxic effects.

As to the other evidences of intoxication mentioned above, nausea occurred in a few cases, but soon passed off; palpitation and præcordial pain certainly result from too large a dose, due probably to the beat laboring against an excessive peripheral resistance, but these symptoms are not produced by smaller doses.

Cough was generally relieved, owing probably to increased depth and regularity of respiratory movements; dyspeptic pains also often disappeared. This I attributed to the improvement of the circulation.

It remains to be said that in cases where the left ventricle is much hypertrophied, or when, from any cause, the heart is beating too violently, spartein quiets and diminishes the force of its action ; also that in some instances of abnormally slow pulse, spartein quickens the rate until it reaches or approaches the normal, and finally, that when the arterial tension is already very high, its action is spent in strengthening the heart-beats.

The foregoing seems to lead to the conclusion that spartein belongs to the digitalis group, and acts directly on the cardiac muscle and the cardio-inhibitory centre in the medulla, thus giving rise to increased force of cardiac contractions, and through the pneumogastrics to regulation of the pulse, generally in the direction of slowing ; in cases, however, in which the pulse is abnormally slow, the drug often accelerates it. A general rise of arterial tension takes place, partly as the effect of the increased force of the heart-beats, but probably chiefly due to a stimulation of the medullary vasomotor centre causing contraction of the vessels of the splanchnic area, with therefore an increased blood supply to the skin and kidneys. This seems to me the only way in which to explain a general rise of blood-pressure, with, at the same time, a vastly increased quantity of blood driven through the cutaneous vessels. The correlation of skin and kidneys in normal function lends itself to the supposition that at the same time more blood is passing through the renal vessels, thus causing increased excretion of urine. The more marked diuresis produced by larger doses may be due to stimulation of the renal cells, as in the case of digitalis, according to many observers. The quantity of urine is not, however, invariably increased, perhaps in relation with the free diaphoresis produced by spartein in some patients. No effect on the temperature was noted. Tracings from three cases are here given.

The following tracings[1] were taken at short intervals of time after spartein had been administered.

CASE I.—A bad case of mitral regurgitation in a youth of nineteen. The chest was bulged out over the præcordial area, and the area of cardiac dulness was bounded above by the third rib, on the right by the right

TRACING 1.   TRACING 2.
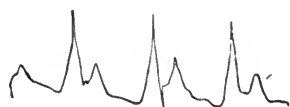
border of the sternum, and extended beyond the nipple. The apex beat was one inch outside the nipple in the fifth space.

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[1] Pressure three and a quarter ounces in all tracings.

Tracing No. 1. Pulse 120, almost hyperdicrotic; respiration 24; face and lips very livid. Spartein sulph. one-quarter grain administered at 12.45 P. M.

At 1 P. M. there was no change in character of pulse tracings. Pulse 120; respiration 24.

Tracing No. 2. 1.30 P. M. Pulse 90; respiration 24; much less lividity of lips; slight rise of tension.

Tracing No. 3. 2 P. M. Pulse 84; respiration 22; blueness of lips had disappeared; the skin everywhere was now warm and moist, instead of cold as before. A tracing at 2.30 P. M. showed a further rise in tension.

TRACING 3.	TRACING 4.
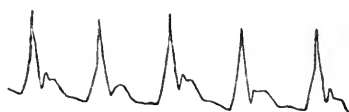
Tracing No. 4. 3.15 P. M. Pulse 84; respiration 20; no lividity; surface of body still warm.

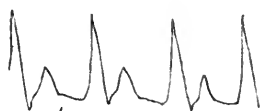The improvement in appearance was now striking from flushing of the surface. He improved somewhat for three or four weeks, but then made no further advance; the rapidity and violence of the cardiac beats, shortness of breath, etc., increased. The dose of spartein was raised gradually from one-twelfth to one-fourth of a grain, every four hours, without effect. He died after being in bed for one month. Digitalis and other remedies were tried without any benefit.

The following tracings are from a case of mitral stenosis.

Tracing No. 5 was taken before administration of spartein. Pulse 72; respiration 18.

TRACING 5.	TRACING 6.
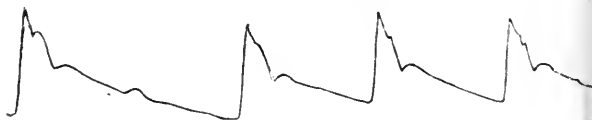
Tracing No. 6 was taken after spartein, one-sixteenth of a grain, had been given every four hours for four days.

The next two tracings are from a case of Graves's disease.

TRACING 7.	TRACING 8.
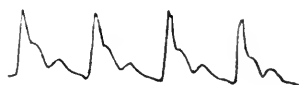
Tracing No. 7 was taken before the administration of spartein. Pulse-rate was 132; respiration 36.

Tracing No. 8 was taken after sulphate of spartein, one-half grain, had been taken three times a day for five weeks. Pulse 76; respiration 18.

Of ten cases of mitral regurgitation, due in seven to rheumatic fever, in one to endocarditis following chorea, in the other two patients to anæmias associated with violent palpitation, eight were completely relieved, and in the two anæmic patients the murmur disappeared, so that it was probably due to relative incompetence from dilatation of the left ventricle. The two cases that did not improve were very bad ones, and were afterward treated by digitalis, and other measures, without any benefit. The quantity of urine and of urea excreted was increased in six patients. Dyspnœa and præcordial pain appeared to be relieved first, followed by the disappearance of œdema in the most speedy instance after three days' treatment. An increased feeling of well-being was noticed by all, at first even by the two patients in whom the cardiac symptoms were not ameliorated. The pulse was rendered less frequent, stronger, and more regular.

In two or three instances it was found that a small dose, one-sixteenth of a grain, given at intervals of three or four hours, produced the greatest regulating effect on the pulse, and relieved arhythmia where larger and less frequent doses had previously failed to do so. A study of these cases and of others shows that spartein is likely to be of great service in mitral regurgitation, relieving the symptoms in most instances rapidly and completely.

In mitral stenosis we may expect good results when the pulse is small, weak, and irregular, but in this form of heart disease the effect produced by it seems of shorter duration, and more immediately dependent on the continual administration of the drug. Though the patients improved whilst taking it, the good effects ceased on leaving it off. Four out of five cases of mitral stenosis to whom I gave it improved, however; one being able to lie down at night, which had been impossible for three years before.

In one woman, after taking one grain every six hours for three weeks, sharp cutting pains at the left shoulder-blade and over the heart came on, with a feeling of tightness in the chest. These symptoms ceased on reducing the dose.

In aortic regurgitation, when the violent pulsation of a greatly enlarged heart produces much pain and distress, spartein is a valuable remedy, quieting and regulating the excited cardiac action without unduly prolonging the systole; in these cases tracings showed that the excessive force and rapidity of the heart-beats were lessened, *pari passu*, with a gradual fall in the arterial tension. Small doses were here most beneficial. In other forms of hypertrophy it will be found useful when the heart acts violently and irregularly. In the hypertrophy combined with extremely high tension of chronic Bright's disease the effect was to stimulate the cardiac contractions, while the arterial tension was not further raised nor the quantity of urine increased.

In a number of patients suffering from various forms of chronic lung disease with obstruction to the pulmonary circulation, and where compensatory changes had not been established in the right heart, or after being established had broken down, I found spartein of great value; dyspnœa, præcordial pain, and palpitation were relieved almost at once, and in several a cough grew less. In two cases, where there was reason to suspect fatty or other changes of malnutrition in the heart-muscle, no benefit was noted.

Of five cases of asthma, four were entirely relieved, the other was not benefited. The administration of spartein was combined with inhalations of pyridin; improvement was slow, all being under treatment from one to five months. The severity of the symptoms was very much diminished, the attacks cut short, and rendered less frequent after a short time, one to two weeks, and the patients could keep comfortable whilst they continued the drug, but if they left it off were liable to relapse. Gradually the attacks returned less and less often and became milder, and finally ceased at the end of the winter; so that the ultimate effect in four out of five cases was satisfactory, though the slow progress was disappointing after the enthusiastic statements that have been made as to the value of spartein in asthma. In one old man suffering from asthma and chronic bronchitis the pulse-rate, that had previously been 96–84, was slowed to 50 in the minute, and was rendered more forcible. This slowing took place after two months' continuous administration of the drug, and though accompanied by marked amelioration of general symptoms, must be, perhaps, regarded as due to accumulation.

In cases of palpitation, without evidence of organic heart disease, spartein gives immediate relief, which becomes permanent after the remedy has been continued for a week or two. In chlorosis, with dilatation of the heart and the usual murmurs, I found that spartein, given in combination with iron, quickly relieved palpitation, pain, dyspnœa, and œdema of the ankles, and in due course the murmurs and the evidences of dilatation when present disappeared.

The effects of spartein in three cases of Graves's disease were remarkable, and if a wider experience cenfirms them, it will be a valuable remedy in this disease. In two of the cases the usual remedies, including a long course of arsenic, and the passing of a constant current through the neck, etc., had been tried without effect. On giving spartein the pulse-rate dropped in one week from constant rates of 132 and 136 to the minute, to rates of 72 and 84 respectively, the coincident throbbing and pulsation of the thyroid and of the great vessels of the neck ceased. Other symptoms were relieved, especially the nervousness and weakness previously complained of, and the size of the thyroid tumor distinctly diminished. The gain in strength and general well-being, with improvement of appearance due to gain of flesh and color, was striking.

In the third case, a more severe example of the disease than either of the preceding, there was general improvement, with diminution of violent pulsation in the thyroid and over the neck and face, but the pulse-rate of 144 was not reduced to less than 96 to the minute, varying between this and 108. This patient suffered from continual fine tremor of the muscles, especially in the limbs; while taking spartein this tremor remained absent, but returned if the drug was left off. She has improved in strength and feels well whilst she is taking it. She has now been taking one-quarter of a grain ever four hours for six months.

I gave spartein for periods varying from two weeks to six months in daily quantities of one-third of a grain to twelve grains, the latter large dose was continued in one case for a month with benefit. It is best to begin with one-sixteenth of a grain every four hours, and gradually increase up to two grains, if necessary until the desired effect on the circulation is obtained. When the dose is given less frequently the result does not seem so good; sometimes a large dose may be gradually reduced without loss of effect. There is no fear of accumulation. The signs of an overdose are palpitation, præcordial pain, small, rapid pulse of high tension, and a feeling of great weakness, or even trembling.

Spartein begins to act in about thirty minutes after it has been taken by the mouth, and its action lasts from about five to six hours. This rapidity of action, at first consisting in a stimulation of the heart, rise of arterial tension not occurring until a little later, indicates the use of spartein in asystolic conditions of valvular disease, where a speedy effect is desired, giving it superiority over more slowly acting drugs.

In these conditions, too, a small dose should be employed (one-sixteenth to one-quarter of a grain), since in these doses spartein seems powerfully to stimulate and regulate the heart with the smallest rise of arterial tension, perhaps not more than is the normal accompaniment of increased cardiac force.

Diuretic effect is most marked with fairly large doses, half a grain to two grains; with small it is not so evident, but is often present. Flushing of the surface of the body occurred in from one to two hours after administration in most cases.

THE CARDIAC RELATIONS OF CHOREA.

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The heart symptoms of chorea demand special consideration as among the most important and peculiar features of the disease. Chorea is rarely a fatal disease in children, and hundreds of cases may be treated without

a death. By far the most serious fact in the clinical history of the disease is the occurrence of endocarditis; but here the danger is remote, not immediate, and lies in the changes which an acute valvulitis may initiate.

A satisfactory study of the cardiac relations of chorea must embrace the condition during the attack, and the subsequent heart history after a period of years. The first question has engaged the attention of many workers, and an attempt is here made to work out the second on a scale not hitherto attempted.

I. Condition of the Heart during the Attack.

Oftentimes the extreme jactitation renders the examination of a choreic child difficult or even impossible. I make it a rule to examine the bare chest. Auscultation through the clothing is not trustworthy, as soft murmurs, readily audible with the stethoscope, may easily escape detection. It is a good plan to let the child lie quietly on a lounge for some time, and make the first examination in the recumbent position when the heart's action is less rapid. Subsequently the effect of exercise and of the erect posture may be tested.

In chorea, as in rheumatism, the evidences of cardiac disease must be sought for, as it is rare to hear complaints of either palpitation, pain, or other symptoms which would direct attention to the heart.

The cardiac disturbance is indicated by the presence of murmurs, alteration in the rate or rhythm of the heart's action, and by pain.

A murmur at one or other of the cardiac areas is by far the most common sign and is present in a considerable number of all cases. Of 410 cases in the records of the Infirmary for Nervous Diseases, there were 120 which presented a heart murmur at the time of examination. In at least 40 cases there was either no note or an imperfect one, and in very many the exigencies of out-patient work prevented a very thorough examination. It can safely be said that in over one-third of the cases a heart murmur was detected, and I have no doubt that this number would have been much increased had each child been stripped and special attention given to the auscultation of the heart.

Of the 120 cases, 113 presented the apex systolic or mitral murmur, in 7 a basic, and in 3 both apex and basic. In 15 cases the heart's action was noted as rapid, and in 6 as irregular. Pain was not a frequent complaint and was noted in only 6 or 7 cases.

It is common experience that the special indication of heart trouble in chorea is the presence of a soft systolic bruit, heard best at the apex or over the body of the ventricles and not often propagated to or beyond the mid-axilla. Basic systolic murmurs are usually associated with anæmia or debility. Diastolic and presystolic murmurs rarely, if ever, occur in acute chorea.

Before discussing the probable nature of these murmurs it will be well to study the anatomical condition of the heart in fatal cases. Fortunately these are rare. I have inspected three cases.

CASE I.—S., a girl, aged eleven; had had acute rheumatism. Admitted to the Montreal General Hospital, under Dr. George Ross, with acute chorea, and died of an intercurrent pneumonia. The movements had almost ceased under hypodermics of arsenic. The autopsy (No. 465 post-mortem records Montreal General Hospital) showed slight hypertrophy of the heart, somewhat thickened mitral curtains with numerous irregular warty vegetations just inside the auricular margins. Two of the aortic segments also presented bead-like vegetations below the corpora Arantii.

CASE II.—T. B., a boy, aged eleven, had chorea in May, 1880, and a second severe attack in July of the same year. No rheumatism. No heart murmur. About the 20th of February, 1881, there was a recurrence, and on March 3d he again came to the general hospital to see Dr. Molson. About the 10th he began to get feverish and extremely restless. On the 14th the temperature rose above 104° F., and he became comatose. The left arm seemed powerless, the right arm and leg were constantly twitching. On the 15th the temperature reached 105° F., and there were cutaneous ecchymoses. He died on the morning of the 16th. The autopsy showed very extensive mitral valvulitis, the vegetations large, soft, grayish-white in color. No chronic affection of the valves. The spleen and kidneys contained many recent infarcts. The brain and membranes healthy, with the exception of a spot of grayish-red softening in the right corpus striatum (lenticular nucleus) about the size of a cherry. It was no doubt embolic, though the arteries of the perforated space were carefully examined for emboli without success.

CASE III.—Emma M., aged eighteen, admitted to the Montreal General Hospital, under Dr. George Ross,[1] and died in five days of exhaustion. There was no rheumatism, and the attack had followed a fright five days before admission. Here, too, the only important lesion was on the mitral valves—a row of soft warty vegetations on the auricular face just within the free margins.

The statistics of fatal cases of chorea have been collected by Sturges[2] and Raymond.[3] Of eighty cases, representing the combined experience of Guy's, Bartholomew's, St. George's, and St. Thomas's Hospitals, Sturges states that there were only five with the heart valves and pericardium reported healthy.

Excluding the London cases from Raymond's table of 79 cases, there are left 34, in only 19 of which there were specific statements as to the condition of the heart, and in every one of these endocarditis was present. I have found the reports of 15 additional cases,[4] which, with the three

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[1] Canada Medical and Surgical Journal, vol. xi.   [2] Chorea. London, 1881.

[3] Dictionnaire encyclopédique des Sciences Médicales.

[4] Mackenzie (Trans. Inter. Med. Congress, 1881), six cases, five of endocarditis. Donkin and Hebb, 1 case, valves normal (Med. Times and Gaz , 1884, ii). Baxter (Brain, vol. ii) one case. Morell-Lavellée (Revue des Maladies de l'Enfance, 1884), one case. Frank (Allg. Wiener med. Zeitung, 1879), one case. Maixner (Med.-Chir. Centralblatt, Wien, 1882), one case. Koch (Deutsches Archiv f. klin. Med., Bd. xl.), four cases

here given makes 18, in 16 of which there was mitral endocarditis. We may say that of 115 fatal cases of chorea, with notes of the state of the heart, in not more than 10 was this organ found normal, and in the great proportion of the cases the lesion was acute mitral valvulitis.

One other point must be considered before we speak of the nature of the heart murmur. In what proportion of the cases is there a history of rheumatism? In 35 of the 120 cases, 29.1 per cent., there was a note of articular affection, either acute or subacute, or of pains which might be regarded as rheumatic.

Much has been written in explanation of the heart murmur of chorea; an idea of how much may be gathered from the fact that a discussion of the theories which have been advanced occupies twelve pages in Hayden's work on *Diseases of the Heart*. We are concerned chiefly with the apex systolic murmur, universally recognized as the most frequent and characteristic sign of implication of the heart in chorea. Speaking generally, we meet with such a murmur in mitral endocarditis, or in relaxation of the ventricular walls, such as occurs in anæmia and fevers, and it is attributed to regurgitation through the mitral orifice, owing either to absolute insufficiency, in consequence of the endocarditis, or to relative insufficiency when the normal valves are unable to close an orifice enlarged as a result of relaxation of the heart muscle. In chorea a special theory of musculo-papillary spasm has been advanced to account for the mitral murmur.

It would be fruitless to re-discuss, in all its aspects, a subject so well and ably presented in various works, particularly in those of Hayden and Sturges. That there is such a condition as spasm of the papillary muscles resulting in a "want of correspondence between the fibres of the ventricle, which obliterate the cavity and those which close the valve," is a plausible hypothesis unsupported, so far as I know, by any clinical or anatomical facts, while the general immunity of involuntary muscular organs in chorea speaks strongly against it.

Sturges thinks that there may be a fatigue paresis of the papillary muscles, similar to that which sometimes involves the limbs, and this weakness and relaxation prevent accurate adaptation of the valve segments. He urges in support the inconstant character of the murmur, appearing and disappearing without apparent cause, and states that it may be synchronous both in its time of arrival and duration with the paresis of the voluntary muscles. I have not been able to trace any such connection, nor have I found in the paretic cases any special tendency to variability in the murmur. Indeed, so far as my experience goes, the *apex* systolic bruit of chorea is by no means an inconstant murmur. If muscular incompetency has anything to do with the production of the choreic bruit, it is more likely to be of a similar character to that which occurs in anæmia, debility, and fevers. Here it is the relaxation of

the walls, and particularly the so-called mitral muscle, which induces a condition of relative insufficiency of the segments and permits of regurgitation.   There may be in chorea, as is well known, a high degree of anæmia, and in a certain proportion of the cases this explanation of the murmur may hold good, but in the great majority of instances the bruit is detected early when there is neither anæmia nor debility.

I am strongly of the opinion that the apex systolic bruit of chorea is, in at least nine out of ten cases, associated with endocarditis:

1. The extraordinary frequency with which mitral valvulitis is met with in fatal cases.   *There is no known disease in which endocarditis is so constantly found, post-mortem, as chorea.*   As the figures above quoted show, it is exceptional to find the heart healthy.   I do not know of statistics of any very large number of fatal cases of acute articular rheumatism to place beside these figures, but I doubt if even this disease, so prone to endocardial complication, can be compared with chorea in this respect.   Dickinson has raised the question whether these beads of fibrin are not rather the consequence than the cause of the valvular defect, and Sturges holds that this appearance does not represent a true inflammation of the endocardium.   Whether a true inflammation or not, I think it must be conceded that the lesion is identical, microscopically as well as macroscopically, with simple or warty endocarditis as we see it in other diseases.

2. The character and location of the murmur are such as experience in other affections has taught us are associated with inflammation of the mitral segments.   I speak of the apex bellows-murmur.   Why this should be so generally associated with the presence of a row of small warty vegetations just within the auricular margins of the curtains, not, one would think, seriously interfering with their functions, is a problem to be solved.   The condition certainly does not necessitate regurgitation, and the bruit may perhaps, as has been suggested, be due to friction of the roughened faces of the segments.

3. The inconstancy of the murmur and its disappearance on the subsidence of the chorea have been urged against this view.   Now we must acknowledge that the bruit may be variable and, indeed, does not necessarily accompany mitral endocarditis.   Kirkes, years ago, insisted upon this, and there have been two autopsies in carefully studied cases of chorea in which the vegetations were found post-mortem, and careful examination failed to reveal a murmur (Baxter: *Brain*, vol. ii.; *Frank. Allg. Wiener med. Zeitung*, 1879.)   The facts which I shall subsequently give suggest that we may during the attack have an endocarditis, not manifest even by a murmur, but which has laid the foundation of future trouble.   The disappearance of the apex murmur of chorea—and of rheumatism too—has been repeatedly followed, and if caused by the small vegetations, this is a natural sequence of the changes which go on

in them.   At first a soft granulation tissue, they become in time firmer, smaller, and ultimately smooth flat elevations mark the spots.   It is not improbable that if we could follow accurately the auscultatory history of a valve affected with acute endocarditis, we should find in many cases that the murmur of the fresh attack disappeared, to reappear when the changes, which it is the misfortune of the acute disease to initiate, have reached a point of interfering with the competency of the valve.

4. In its sequel the cardiac affection of chorea has been supposed to differ from that of other diseases, " as none of the injurious after-conse-quences which attend endocarditis in its other relations . . . are found to ensue here" (Sturges).   A study of any large number of choreics some years subsequent to the disease tells, as I shall show, a sad tale to the contrary and proves that the primary heart trouble is, in a majority of cases, at least, endocarditis.

II. The Condition of the Heart in Choreic Patients some Years after the Attack.

Owing, doubtless, to the difficulties inherent to such an investigation, this line of inquiry has not been followed by many workers.   Indeed, so far as I know, Dr. Stephen Mackenzie's paper, at the London International Congress, is the only one which has dealt with the subject, and he has examined thirty-three patients at periods from one to five years subse-quent to the attack.   Postal cards were sent to all the choreic patients, in sets of twenty-five, who had been in attendance at the Infirmary since 1876, asking them to return for the purpose of having the heart exam-ined.   One hundred and ten came back, a number much exceeding our expectations.[1]   All the more recent cases in attendance at the clinics have been excluded—all, indeed, after March, 1885, so that the study is based upon 110 cases in which the examination was made *more than two* years subsequent to the attack of chorea.   In each case, as it came, reference was made to the original notes, questions asked concerning subsequent attacks, and rheumatism, and the heart examined in the re-cumbent and erect postures, at rest and after exertion.

The results summarized, are as follows : In 43 cases the heart was normal, in 54 there were signs of organic disease, and in 13 there was functional disturbance.

The tables which I have prepared are too full for publication, but the following abstracts of the cases affected will be of interest :

1871 (sixteen years).   Two cases.

Case I.—Laura C. R., aged twenty-five.   Several attacks subsequent to 1871.   Never had rheumatism until February, 1887.   No note of

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[1] It speaks well for the stability of the artisan class in Philadelphia that so many of the postal cards reached their destination.   Comparatively few were returned from the Post-office with the comment— *Removed ; cannot find.*

heart condition in previous attacks.   Has attacks of shortness of breath. *Status præsens:* Impulse is forcible.   Dulness increased.   Apex systolic murmur heard to posterior axillary fold.   Second left accentuated.

Case II.—Kate L., aged twenty-one.   Two or three attacks after 1871; bad one in 1878.   In 1882, had inflammatory rheumatism, never any joint trouble before this time.   In 1878, note is "impulse strong; apex murmur."   She has had attacks of shortness of breath. *Status præsens:* Feeble thrill; localized purring presystolic murmur.   Loud apex systolic transmitted to posterior axillary fold.   Second left accentuated.

1872 (fifteen years).   One case.   No heart affection.

1874 (thirteen years).   Three cases.

Case IV.—Annie M., aged twenty-five.   Second attack in 1883, third in 1885.   Had rheumatism just before the first attack.   No note of heart in first or second; in 1885, an apex systolic murmur. *Status præsens:* Loud apex systolic transmitted to axilla; second left accentuated; transverse dulness increased; impulse forcible.

Case V.—Bertha G., aged twenty-five.   A second attack in 1880. No rheumatism.   In 1880, a soft systolic murmur. *Status præsens:* Impulse not forcible.   Loud apex systolic murmur propagated to axilla. Very ringing and accentuated second left.   Has palpitation and attacks of shortness of breath.

Case VI.—Charles M., aged twenty-eight.   Second attack in 1880. Had pains in joints before second attack.   No note of heart.   Is strong and well, no subjective symptoms. *Status præsens:* Soft apex systolic murmur, not heard in axilla or in pulmonary area.   No increase in dulness.   Second left accentuated.

1875 (twelve years).   Two cases; one normal.

Case VII.—Hester G., aged twenty.   Original attack very severe; a second in 1879, and one since.   No rheumatism.   No note of heart in attacks.   For two years has had attacks of palpitation and dyspnœa. *Status præsens:* Impulse forcible.   Presystolic thrill; rough presystolic murmur.   Loud accentuated second left.

1876 (eleven years).   Eight cases; one normal.

Case IX.—Annie T., aged seventeen.   Since 1876 three attacks, last in 1885.   No rheumatism.   In 1885, a soft systolic murmur.   Complains that she does not lie comfortably on left side. *Status præsens:* Impulse forcible, outside nipple.   Apex systolic loud, heard well in axilla.   Second left accentuated.

Case X.—Robert P., aged twenty-one.   Second attack in 1879.   No rheumatism.   No previous note of heart. *Status præsens:* Action rapid, impulse diffuse.   Dulness not increased.   Blowing systolic murmur just above apex, not heard in axilla; disappears on exertion.   Second left accentuated.

Case XI.—Lizzie H., aged sixteen.   Many attacks since 1876, two of them severe.   Had rheumatism when four years old.   In 1878, second left was reduplicated. *Status præsens:* No evident enlargement of heart; impulse feeble; no thrill.   At apex double murmur, presystolic short, not rough.   Systolic not loud, not transmitted to axilla.   On

exertion louder. Both very distinct. Second left very loud. Has occasional attacks of palpitation.

CASE XII.—Ida L., aged eighteen. Three attacks since 1876. No rheumatism. No note of heart in 1879. No symptoms. *Status præsens:* Beat forcible; dulness increased. Loud apex systolic murmur, heard at angle of scapula and very distinct along left margin of sternum. At aortic cartilage a soft systolic bruit. Second left ringing and accentuated.

CASE XIV.—Jennie A., aged twenty. Second attack in 1878, third in 1879. No rheumatism. In 1879, sound, stated to be normal. *Status præsens:* Impulse not forcible, no apparent enlargement. In fourth left space a rough presystolic murmur; limited in area. At apex a systolic bruit, transmitted to axilla, and heard at angle of scapula. Second left very accentuated. Sounds at apex booming. No symptoms, always good health.

CASE XV.—Annie L., aged twenty-four. Two attacks since, last one in 1882, when for the first time she had rheumatism. No note of heart. *Status præsens:* Apex an inch outside nipple. Impulse forcible. No thrill. Presystolic murmur, not rough, in fourth space; apex systolic, heard in axilla and at angle of scapula. Loudly accentuated second left. Has had palpitation and shortness of breath on exertion for three years.

CASE XVI.—Miriam C., aged nineteen. Two attacks since. Never had rheumatism. Has had heart disease for some years; is now in bed with it.

1877 (ten years). Seven cases; three affected.

CASE XVII.—Andrew G., aged twenty-one. The attack followed acute rheumatism. In 1878, a soft systolic murmur. No symptoms. *Status præsens:* When recumbent sounds clear. Erect and after exercise well-marked apex systolic, not transmitted. Second left ringing, accentuated, and reduplicated. No enlargement of the heart.

CASE XX.—Mamie L., aged fifteen. Rheumatism (acute) four weeks before onset of chorea in 1877. No attack since. In 1877, "mitral murmur." No symptoms. *Status præsens:* Impulse forcible, beat outside nipple line. Transverse dulness increased. Loud apex systolic murmur, propagated to posterior axillary fold. Second left very accentuated.

CASE XXIII.—Rose McF., aged twenty-four. Attack in 1877 prolonged and severe; none since. No rheumatism. In 1877, a faint apex systolic murmur. *Status præsens:* Heart's action violent; impulse forcible; apex outside nipple. Marked presystolic thrill. Presystolic murmur in fourth interspace. Systolic murmur in fifth space, and heard as far as posterior axillary fold. Second sound accentuated at the second left cartilage, and also heard loudly in axilla. Patient is at times very short of breath; has attacks of palpitation and has fainted.

1878 (nine years). Two cases; one affected.

CASE XXIV.—Minnie C., aged fifteen. Attacks also in 1879, '80, and '85. Rheumatism in 1885, never before. In 1878 an apex systolic murmur. No symptoms. *Status præsens:* Impulse forcible; apex outside nipple-line; transverse dulness increased. Apex systolic murmur

heard to posterior axillary fold. Double murmur at aortic cartilage; diastolic heard also on sternum. Second left not accentuated.

1879 (eight years). Four cases; all affected.

CASE XXVI.—Fannie N., aged fifteen. Second attack in 1885. Has had rheumatic pains, but no swelling of joints. In 1879 had pain about the heart, and since then has had occasional attacks of palpitation on exertion. *Status præsens:* Impulse in fifth a little out. Transverse dulness increased. Presystolic thrill, most marked at apex. Rough presystolic murmur at and just above the apex. Soft systolic at and outside apex beat. Second left much accentuated, and is also very ringing and loud in axilla and at angle of scapula.

CASE XXVII.—Lizzie R., aged twelve. Three subsequent attacks, 1880, '83, and '86. Those of 1879, '80, and '83 very severe. No rheumatism. No previous note of heart condition. Has had no heart symptoms. *Status præsens:* Forcible, diffuse impulse. Apex a little outside nipple. Systolic murmur at apex transmitted to axilla and heard feebly at angle of scapula. Second left very accentuated.

CASE XXVIII.—Rose F., aged thirteen. Second attack in 1881. Heart normal in 1879. Has been short of breath, particularly on exertion. *Status præsens:* Impulse strong. Transverse dulness increased. Rough presystolic thrill. Very rasping presystolic bruit. Maximum intensity in fifth, just within nipple. Second left accentuated and reduplicated. Aortic sounds feeble.

CASE XXIX.—Mary G., aged thirteen. Several attacks since 1879; in 1885 a bad one, and now, May, 1887, is in infirmary with a severe attack. Rheumatism in 1885 with chorea, not before; and this time has had swollen joints. In 1885 had systolic apex murmur. *Status præsens:* Impulse in fifth and sixth, outside nipple. Dulness increased. Loud apex systolic bruit propagated to axilla and scapula. Second left much accentuated. Has had attacks of cardiac dyspnœa in which she could not lie down. At times severe pain at heart.

1880 (seven years). Five cases; three affected.

CASE XXXII.—Ellen McG., aged twenty-three. No rheumatism. No note of heart in 1880. Is anæmic; has palpitation, shortness of breath, and at times severe pain at heart. *Status præsens:* Action rapid and forcible; dulness increased. Presystolic thrill all over mitral area. Rough presystolic murmur. Soft systolic bruit just outside apex. Second left is loud but not specially accentuated. Examined again some weeks after a course of iron and arsenic, which had relieved the anæmia; murmurs unchanged.

CASE XXXIII.—Angela W., aged eighteen. Four attacks since the first in 1880. No rheumatism. Heart, in 1884, said to be normal. Has had pain at heart, and is at times short of breath. *Status præsens:* Impulse forcible. Soft apex systolic, heard as far as middle axilla, and increased on exertion; not altered by position. Second left a little accentuated.

CASE XXXIV.—Florence B., aged twenty. Rheumatism six months before the attack. In 1880 an apex systolic murmur. Has had since then occasional attacks of palpitation. *Status præsens:* Impulse forcible; apex a little out, but no special enlargement. Apex systolic murmur, heard well to middle axilla. Marked accentuation of second left.

1881 (six years).   Sixteen cases; nine affected.

CASE XXXVI.—Louis O., aged seventeen.   At least five attacks since 1881.   No rheumatism.   No note of heart.   No symptoms.   *Status præsens:* Apex beat in fourth space in nipple line, heaving and forcible; dulness increased.   Loud systolic murmur at apex heard to posterior axillary fold, but not above fourth space.   When recumbent it is heard in second and third spaces as well.   Second left very accentuated.

CASE XXXIX.—Frank N., aged thirteen.   A second attack in 1884.   No rheumatism.   Heart said to have been normal in 1884.   For some time has been very short of breath, and gets tired on exertion.   *Status præsens:* Precordia bulges.   Impulse diffuse; dulness increased.   Presystolic thrill in fourth interspace.   A blubbering presystolic murmur.   Maximum intensity in fourth space.   Loud blowing systolic bruit; heard also in axilla.   Very accentuated second left.   Aortic second feeble.

CASE XL.—William P., aged twelve.   Second attack in 1883, third in 1885.   No rheumatism.   Condition of heart not noted.   Has no symptoms.   *Status præsens:* Diffuse apex beat in nipple line, in fourth and fifth spaces.   Transverse dulness increased.   In erect posture sounds clear.   Recumbent, distinct apex systolic murmur transmitted along anterior axillary fold.   In third and fourth interspaces double murmur, the diastolic not rough.   Second left very much accentuated.

CASE XLI.—Joseph M., aged thirteen.   First attack January, 1881; second, October, 1881.   No rheumatism.   In 1881 a soft systolic murmur.   Has had vertigo and rushes of blood to head.   *Status præsens:* Impulse not forcible; dulness slightly increased.   No thrill, but loud shock of first sound.   Rumbling presystolic murmur, maximum in fifth space in nipple line, is well heard to anterior axillary fold.   Loudly accentuated second left.   No systolic murmur even when recumbent.

CASE XLII.—Carrie B., aged ———.   Second attack in 1884; third in 1886, all severe.   No rheumatism.   In 1881 heart normal.   No symptoms.   *Status præsens:* Visible, somewhat forcible, pulsation in third, fourth, and fifth spaces.   Erect posture, no murmur; recumbent, systolic bruit at second left, localized.   Second sound here loud, sharp, and reduplicated.

CASE XLIII.—Mary B., aged sixteen.   Three or four slight attacks since 1881.   In 1881 pains in joints, no swelling.   In 1881 an apex bruit.   Has had no heart symptoms.   *Status præsens:* No enlargement.   When erect, sounds clear; recumbent, systolic bruit at second left, with marked accentuation of second sound.

CASE XLV.—Marcus Van A., aged eleven.   None since.   No rheumatism.   In 1881 a somewhat loud musical bruit.   No symptoms.   *Status præsens:* Apex beat in nipple line, fifth space.   Impulse not specially forcible.   Loud blowing systolic bruit at apex, propagated to axilla and heard well at scapula.   Second left accentuated and reduplicated.

CASE XLVI.—Alice W., aged seventeen.   Second attack in 1882.   Pains in knees in 1882, and lately in shoulders.   Heart normal in 1881 and 1882.   *Status præsens:* Soft apex systolic murmur, not heard in axilla.   Second left accentuated.   No enlargement of heart.   Has at times palpitation and shortness of breath.

CASE XLIX.—Jessie J., aged nineteen.   Three attacks since.   Rheumatism with attack in 1883, and again in 1885.   Heart said to be

normal in 1885. *Status præsens:* Beat in fifth space outside nipple. Dulness increased. At apex a soft systolic bruit, not heard in axilla, except after exertion. In fourth space, in localized region, a soft diastolic murmur, not increased toward sternum, not heard at aortic or pulmonary cartilages; it also is intensified by exertion. Has "attacks at the heart," faints, and gets cold. Has much pain at times and is short of breath.

1882 (five years). Thirteen cases; ten affected.

Case L.—Tillie M., aged fifteen. Attacks also in 1883 and 1886. No rheumatism, but lately has had pains in shoulders. No note of heart. Has had at times pain at heart and palpitation. *Status præsens:* Apex beat just within nipple, a little forcible. Apex systolic bruit heard along anterior axillary fold and in middle axilla. Second left accentuated.

Case LII.—Annie B., aged eighteen. No rheumatism. In 1882 a loud apex systolic bruit. Has had shortness of breath and palpitation. *Status præsens:* Beat forcible, outside nipple line; dulness increased. Apex systolic murmur, heard also in axilla and at angle of scapula; also as high as second rib. Second left loudly accentuated.

Case LIII.—Mary J., aged fourteen. Attacks also in 1883, '84, and '85. No rheumatism. Heart normal in 1882. No symptoms. *Status præsens:* Impulse forcible. Soft systolic bruit at apex, heard as high as third space, not propagated to axilla. Remarkable accentuation of second left.

Case LIV.—Bessie P., aged thirteen. Second attack in 1883. Rheumatism in hands and feet with first attack. Heart said to have been normal. *Status præsens:* Impulse forcible. Apex in sixth space an inch outside nipple line. Slight presystolic rumble at apex. Loud systolic murmur in second and third interspaces, not so marked at apex. Second left loudly accentuated. No symptoms.

Case LV.—Harriet H., aged eight. No rheumatism. Died of heart disease with dropsy, November 8, 1883.

Case LVII.—Sadie C., aged twelve. Second attack in 1885. In 1886 ankles swollen and sore; never had rheumatism with the attacks of chorea. No note of heart in 1882. In 1885 "hypertrophied and loud apex systolic murmur." *Status præsens:* Apex an inch outside nipple line. Impulse forcible. Dulness increased. No thrill. High-pitched systolic bruit at apex, loud also in axilla and at angle of scapula. Very accentuated second left. Has much throbbing of heart on exertion, and has vomited after skipping.

Case LIX.—Maggie W., aged fifteen. Second attack in 1885. No rheumatism. Heart normal in 1882. *Status præsens:* A soft murmur at apex, not transmitted; increased on holding breath. Second left very accentuated.

Case LX.—Fannie S., aged eleven. Second attack in 1883, third in 1884, and fourth in 1885. Rheumatism in 1883; severe attack. In November, 1882, a basic systolic murmur, which persisted in 1884. In June, 1885, there were hypertrophy and evidence of aortic and mitral disease. Died of cardiac dropsy, July 11, 1886.

Case LXI.—Catherine B., aged thirteen. A second slight attack in spring of this year. No rheumatism. No note of heart in 1882. *Status præsens:* Impulse forcible, at and a little outside nipple line. Dulness

increased. Feeble presystolic thrill. Loud apex systolic murmur, propagated to axilla. In fourth space just within nipple, a rumbling presystolic murmur. Second left very accentuated. Has had at times severe pain in heart; no shortness of breath.

1883 (four years). Fifteen cases; eight affected.

Case LXII.—James G., aged thirteen. Second attack in 1885, third in 1886. No acute rheumatism; pains in shoulder. In 1886 a systolic apex murmur. *Status præsens:* Apex outside nipple line; large area of forcible impulse in fourth and fifth spaces. Transverse dulness increased. No thrill. High-pitched apex systolic murmur transmitted to axilla and angle of scapula. In fourth space a faint rumble before first sound; second left accentuated and reduplicated. Has no heart symptoms.

Case LXIII.—Tinnie B., aged twelve. Second attack in 1884, third in 1886. No rheumatism. In 1886 well-marked cardiac lesions. *Status præsens:* Apex beat forcible, outside nipple line. Dulness increased. Loud, rough apex systolic bruit, transmitted to scapula; second left accentuated and reduplicated. Has pain, and at times palpitation.

Case LXIV.—Henrietta K., aged twenty-one. Second attack in 1884. No rheumatism. In 1883 heart's action intermittent. *Status præsens:* Beat forcible. No thrill. Loud, rough apex systolic bruit heard at angle of scapula. Second left much accentuated. Has great shortness of breath on exertion.

Case LXV.—Lorenzo D'A., aged eleven. Two slight returns. No rheumatism. No note of heart in 1883. *Status præsens:* Impulse slow, forcible; apex in fifth space, in nipple line. Soft apex systolic murmur, louder on exertion; not heard at mid axilla. Second left much accentuated and reduplicated. Has distress at heart on exertion.

Case LXVI.—Nellie H., aged nine. Second attack in 1884, third in 1885. No rheumatism. No note of previous heart-condition. *Status præsens:* Apex beat diffuse, maximum in sixth space, one inch outside nipple line. Dulness increased. No thrill. Loud apex systolic murmur transmitted to angle of scapula. Just below and inside the nipple a *soft* presystolic bruit. Second left much accentuated. In December, 1886, the child had a sharp attack of cardiac dyspnœa.

Case LXVII.—Edward R., aged twelve. Second attack in 1885. No clear history of rheumatism; has had pains. No note of heart. *Status præsens:* Beat in fifth, just outside nipple line. Dulness increased. Just above apex, in localized region, a presystolic murmur; louder in recumbent posture. When breath is held, soft apex systolic murmur. Second left much accentuated.

Case LXXI.—Annie C., aged eleven. Bad attack for a month; no recurrence. No rheumatism. No note of heart in 1883. *Status præsens:* Beat at nipple, in fourth space. Transverse dulness increased. Feeble thrill above apex. Rough presystolic murmur in third and fourth spaces; heard also along pectoral fold. Just outside apex a soft systolic. Loudly accentuated second left. Is short of breath on exertion.

Case LXXIV.—William H., aged fifteen. Still has twitches at times. No rheumatism. No note of heart. *Status præsens:* Apex beat in nipple line. Dulness increased. Feeble presystolic thrill at apex. In second left interspace a loud, *rough*, systolic murmur. In third and fourth spaces a softer bruit. Distinct presystolic rumble above apex beat. First sound reduplicated at apex. Second left much

accentuated. Has what his mother calls "asthma spells," particularly on exertion.

1884 (three years). Thirteen cases; ten affected.

Case LXXVII.—Harry B., aged thirteen. Second attack in 1885, third in 1886. Rheumatism with attack in 1884. Apex murmur in 1886. *Status præsens:* Impulse feeble, just inside nipple line. No thrill. Dulness not increased. Soft apex systolic bruit; heard well to mid-axilla. Rough presystolic murmur, maximum intensity *at apex.* Both intensified after exertion. Loudly accentuated and reduplicated second left. No palpitation; no shortness of breath. Cheeks are flushed, and he has a *cardiac* look.

Case LXXVIII.—Ida M., aged fourteen. No other attack. No rheumatism. No note of heart. *Status præsens:* No enlargement. Soft apex systolic bruit propagated along anterior axillary fold. Systolic murmur at second left space. Loudly accentuated left. Has no symptoms.

Case LXXIX.—George G., aged thirteen. No other attack. Had pain in left hip in 1884. Heart normal. *Status præsens:* No enlargement. Soft apex systolic bruit; not heard in axilla, but well-marked in third left apex. Second left very accentuated, and the diastolic shock here loud.

Case LXXX.—Nellie M., aged eleven. Right knee was swollen. No note of heart. *Status præsens:* Forcible apex beat in fifth space, one inch outside nipple line. Dulness increased. At apex first sound booming and echoing. In third and fourth left spaces loud systolic bruit; feeble at second left cartilage; not audible in axilla; faintly heard in mid-sternum. Much accentuated second left. Has no symptoms.

Case LXXXII—John D., aged eighteen. Second slight attack in 1886. In 1887 slight rheumatism. In 1884 soft murmur at base. *Status præsens:* Impulse just within nipple. Dulness increased. No thrill. At apex a rumbling presystolic murmur. No systolic bruit audible at apex. At fourth left and up and down the sternum is a long-drawn diastolic murmur, of maximum intensity on sternum, opposite fourth cartilage. Heard at aortic cartilage and at xiphoid. No aortic systolic bruit. Second left very accentuated. Posture did not alter the murmurs. He had no heart symptoms.

Case LXXXIII.—Kate H., aged fifteen. Rheumatism very badly at the time. Heart said to be normal. *Status præsens:* Apex beat forcible, outside nipple line. Cardiac shock over a large area. No thrill. Loud apex systolic murmur propagated along anterior axillary fold. Second left much accentuated. Has no heart symptoms.

Case LXXXIV.—Henry M., aged fifteen. No rheumatism. Heart normal in 1884. *Status præsens:* Impulse diffuse in fourth and sixth spaces, one inch outside nipple line. First sound at apex booming. When recumbent a soft systolic murmur in second and third left spaces near sternum. Second left much accentuated.

Case LXXXVI.—Lillie D., aged twelve. No rheumatism. Heart normal in 1884. *Status præsens:* No enlargement. When recumbent a soft, long, apex systolic murmur, not heard in axilla or in second or third spaces. Disappears when erect. Second dull and loud, not sharp and ringing, like second right.

Case LXXXVII.—Fannie P., aged ten. Second attack in 1885. Pains in wrists, but no swelling. In 1885 apex murmur, presystolic; soft basic murmur; hypertrophy. *Status præsens*: Forcible apex beat in fifth space, outside nipple. Feeble thrill. Loud, high-pitched apex systolic bruit, transmitted to scapula; and, in fact, all over left chest. Presystolic bruit. At aortic cartilage a rough, systolic murmur. Second left accentuated. Has palpitation at times.

Case LXXXIX.—Annie T., aged thirteen. Several slight returns since 1884. Rheumatism three months after the chorea. No note of heart in 1884. *Status præsens*: Action rapid, apex a little out from nipple line. Dulness increased. Loud, rough systolic bruit at apex, transmitted to scapula. Second sound very accentuated at third left cartilage. Has "spells" with her heart; has fainted. Is short of breath on exertion.

1885 (two years). Eighteen cases; five affected.

Case XCI.—Lizzie B., aged fifteen. No attack since. No rheumatism. No note of heart. *Status præsens*: Impulse strong. Thrill at apex. Localized systolic murmur at apex, not heard in axilla or on third or second spaces. Loudly accentuated second left.

Case XCII.—Alice N., aged ten. No rheumatism. In 1885 loud mitral systolic. *Status præsens*: Apex beat diffuse in fourth and fifth spaces in nipple line. Transverse dulness increased. Apex systolic murmur, heard beyond mid-axilla; intensified in recumbent posture. Marked accentuation of second left.

Case XCVII.—William R., aged nine. No rheumatism. Heart in 1885 said to be normal. *Status præsens*: No enlargement. First sound not clear, and on exertion a soft systolic murmur at apex; heard also two inches beyond nipple, and as high as third rib. Loudly accentuated second left. Has no symptoms.

Case C.—Georgie G., aged thirteen. No rheumatism. In 1885 a basic systolic murmur. *Status præsens*: Impulse diffuse, forcible; apex just outside nipple line. Dulness increased. Thrill. At apex loud systolic bruit, propagated to posterior axillary fold. Second left dull, thudding, and accentuated. Heart's action irregular. Has palpitation and shortness of breath.

Case CI.—Jennie N., aged nine. Second attack in 1886, in which she had rheumatism. Heart in 1885 normal. In 1886 loud apex systolic murmur. *Status præsens*: Impulse forcible, apex in nipple line. Dulness increased. Apex systolic transmitted to axilla and angle of scapula; heard also as high as second rib. Second left loudly accentuated. Has, at times, throbbing, palpitation, and pain.

Of the 43 cases in which the heart was found normal, 12 had had three or more attacks, 8 had had two, and 23 a single attack. There was a history of rheumatism in 8—*i. e.*, 18.6 per cent. In 6 of these cases the rheumatism was acute. In only 2 cases had there been a murmur noted at the time of the original attack.

From the cases presenting abnormal physical signs, 13 may be separated as examples of functional trouble. They are cases without signs of enlargement of the heart and with localized or variable murmurs. Ten presented soft apex systolic bruits not propagated, in 3

variable with position. In most of these there was accentuation of the second left pulmonary sound, but I do not think much stress is to be placed upon this sign in young persons, as it is by no means uncommon in normal hearts. Particular attention was paid to this point in the examination of all the cases and comparison made between the sounds in the second right and second left spaces. There were 10 normal cases in which the pulmonary sound was distinctly louder than the aortic, and in some instances reduplicated. No note was taken of the murmurs, so often developed in the region of the pulmonary artery during respiration and which are extremely common in thin-chested children. In 2 cases the sounds in this region were clear in the erect posture, but in the recumbent position systolic bruits developed; in both the second sound was accentuated, and in one the area of pulsation somewhat increased. In a third case there was a soft systolic murmur in the second and third spaces in the recumbent position only, with accentuation of the pulmonary sound and the apex beat outside the nipple line. In some of these there may have been organic changes in the valves, but I deemed it best to exclude all doubtful cases.

There remain for consideration 54 cases with signs of valve disease. In 21 cases there had been three or more attacks of chorea.

The facts regarding rheumatism are interesting. In 22 cases, 40.7 per cent., there was a distinct history of articular trouble, sometimes with the chorea, but in 6 cases from one to five years after the attacks. Comparing the frequency of rheumatic affection in this group, 40.7 per cent., with that in the total number of cases, 15 per cent., or with the group of 43 normal cases, 18.6 per cent., we see the influence this disease exercises in producing the heart lesions. We have, however, the larger proportion, 59.3 per cent., of the cases without any history of rheumatic trouble. Of the 21 cases which had had three or more attacks of chorea, only 7 had rheumatism.

In this group there are rather more than 3 females to 1 male, a proportion considerably greater than in the total number of cases.

With reference to the nature and seat of the lesion, there were 44 cases of uncomplicated mitral affection and 4 instances of combined aortic and mitral disease. In 25 cases there was a mitral systolic murmur; in 17 a distinct presystolic murmur, with or without a thrill, and usually with a systolic bruit. Of the aortic lesions Case XII. presented a soft aortic direct murmur and a mitral systolic; Case XXIV. a double aortic murmur as well as a mitral systolic; Case LX. died of combined aortic and mitral disease; Case LXXXII. presented the unusual combination of an aortic diastolic and a mitral presystolic murmur. The overwhelming proportion of cases, with mitral lesions, is what we might expect from the constancy with which the acute endocarditis of rheumatism and chorea attacks these valves

There are many points of interest in physical diagnosis which these cases illustrate, but I am only concerned now with the clinical problem of the frequency with which organic heart disease follows chorea.

Not many of the cases had subjective symptoms of cardiac disease. In 14 instances there was complaint of shortness of breath; 16 cases had attacks of palpitation, and in 6 cases there was cardiac pain. Two cases had died of heart disease, 1 was in bed with cardiac dropsy, and in several others there were premonitions of heart failure. The majority illustrated the important clinical law in valvular disease, that the symptoms do not result from the lesion, but from failure in the compensatory action which for years may equalize the circulation and obviate completely the most serious mechanical defect.

A study of these cases justifies, I think, the following conclusions:

1. That in a considerable proportion of cases of chorea—much larger than has hitherto been supposed—the complicating endocarditis lays the foundation of organic heart disease.

2. In a majority of the cases the cardiac affection is independent of rheumatism, and cannot be regarded as in any way associated with it; unless, indeed, we hold with Bouillaud, that in the disease " chez les jeunes sujets le cœur se comporte comme une articulation."

3. As the presence of an apex systolic murmur in chorea is usually an indication of the existence of mitral valvulitis, as much care should be exercised in this condition as in the acute endocarditis of rheumatism. Rest, avoidance of excitement, and care in convalescence, may do much to limit a valvulitis, and obviate, possibly, the liability to those chronic nutritional changes in the valves wherein lies, after all, the main danger.

HEREDITARY TREMOR,

A HITHERTO UNDESCRIBED FORM OF MOTOR NEUROSIS.[1]

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THE object of this paper is to call attention to a peculiar hereditary motor disorder which has heretofore never to my knowledge been systematically described by medical writers.

DEFINITION.—The affection in question consists of a fine tremor, con-

stantly present in typical cases during waking hours, voluntarily controlled for a brief time, affecting nearly all the voluntary muscles, chronic, beginning in very early life, not progressive, not shortening life, not accompanied with paralysis or any other disturbances of nervous function. It resembles to some extent the tremor of paralysis agitans, still more a simple neurasthenic tremor. A most striking clinical feature is its marked hereditary or family type, and its transmission along with other nervous diseases.

HISTORICAL.—Sauvages (*Nosolog. meth.*, 1766, quoted by Reynolds's *System of Med.*, iii. p. 196) refers to the case of a pregnant woman who suffered from a fright and gave birth to a child affected with a "feeble" tremor. Most (*Encyclopædia de méd. Praxis*, Paris, 1836, ii. 555) refers in a few words to several cases of tremor which all occurred in one family. Sanders (Reynolds's *System*, i. p. 724) reports a case of paralysis agitans non-senilis beginning at the twelfth and lasting till the sixty-sixth year. Trousseau says that senile tremor is not confined to the aged, but may affect persons of middle age or even adolescents. Weschede (Virch. *Archiv*, Bd. l. Heft 2) reports a case of supposed paralysis agitans occurring in a boy caused by the kick of a horse. Post-mortem showed, however, that this was a case of disseminated sclerosis. And the statements of Duchenne (Ziemssen's *Cyclop.*, xiv. p. 396) and other early observers that paralysis agitans occurs sometimes in early life are based possibly on observations of cases like Meschede's. Hennis Green, Gowry, and Sanders speak of temporary tremors occurring in childhood. Wharton Sinkler, in Pepper's *System of Medicine*, vol. v., art. "Tremor," speaks of a patient who had suffered from tremor all her life. Since finishing this article my attention has been called to a case of "congenital tremor," reported by Dr. Predazzi, of Geneva (*Gazetta degli Ospitali*, June 26, 1887). The patient had suffered from birth from an oscillatory tremor of the head and eyeballs.

The above forms all that I can find bearing on the affection I am about to describe and it is evident that no one has more than incidentally, if at all, observed and reported such cases as my own. Most, Axenfeld, and Sinkler have evidently seen examples of the neurosis I am describing.

CLINICAL CASES.—I have seen and studied the tremor in three families, and in all it preserves a general clinical resemblance. In one family I have obtained by far the most complete and striking records, and I can best serve my purpose by first giving an account of the disease as it occurred in one of its members.

FAMILY A. CASE I.—N. R., aged seventy-seven, w. U. S. The family history will be referred to later. The patient is a man of medium weight, spare build, and of nervous, excitable temperament. He is a much more than ordinarily intelligent man, taking an active interest in religious

political, and local affairs. In early life he took a degree in medicine, but never practised. His habits have been good. He has never used alcohol or tobacco. He has had no fits or other nervous disease, but has had pneumonia five times. He has had the tremor from early childhood, it has continued about the same for over seventy years. It affects his arms most, but also his lower limbs. Any noise or excitement increases it, and enlarges its range. He has no nystagmus, and his eye-sight is good. The tremor affects the two sides about equally. It is fine in character, like a neurasthenic tremor, and there is not that wide range in the movement characteristic of old cases of paralysis agitans. It is accompanied with a slight contracture of the fingers, but otherwise there is no motor disturbance, such as rigidity, cramp, or paresis. The tremor can be voluntarily controlled for a short time, so that the patient has been able all his life to pursue his trade of watch-making, and he acquired justly the reputation of being the best workman in his section of the country. I have myself seen him pick up a piece of the delicate machinery of a watch in his forceps, carry it to the place where it should be fitted, the hand trembling like an aspen until just before it reached its destination, when it suddenly became firm and steady and deposited its burden just in the right place. The tremor does not increase, nor does it cease when a voluntary movement is made as shown above; it is only by a distinct and special effort of the will that momentary control is obtained. It is slightly apparent in the handwriting, though this is now as steady as that of most men who are seventy-seven years old. He controls the tremor better and writes more smoothly with a lead-pencil.

When excited the tremor affects his head, which oscillates, and also his muscles of articulation, so that speech is indistinct, while all the extremity muscles are affected in a greatly exaggerated way, thus increasing greatly his apparent mental excitement. The tremor ceases during sleep.

Close examination shows his muscular system to be normally developed and strong. The patella tendon reflex is normal, not absolutely exaggerated at least, though considering his age it may be relatively so. His gait and posture are natural, nor does he in any way show evidence of natural malformation, or progressive nervous disease. He can even now do work upon a watch.

This patient presents in its most marked form the tremor which runs through the family. The history of this is most interesting.

I. The grandfather was greatly addicted to alcohol and tobacco. He had no tremor.

II. The father was a man of very nervous temperament, quick in movement, violent in temper. He used no alcohol or tobacco. Had no tremor, but became insane early in life and died at the age of fifty-five.

His wife was a strong, healthy woman, without tremor.

III. The patient, whose history has been given, was one of nine children, six sons and three daughters, all of whom had the tremor and a slight flexion of the fingers.

Of the nine, (1) the oldest child, a daughter, had nine children, four sons and five daughters, one son became insane. All the children had the tremor more or less, especially when excited.

(2) The second child, a boy, became insane at twenty-one, but lived till eighty. He had the tremor.

(3) The third child, a daughter, married a man who became insane. She had a son and two daughters, the son became insane probably. The daughters were healthy. All had the tremor.

(4) The fourth child, a son, had five children, who all had the tremor.

(5) The fifth child was the patient whose history is given. He was married twice, and had two children by the first, and one by the second wife. These children were unusually intelligent, and even talented. All had the tremor in a slight degree.

(6) The sixth child was a son still living and reported "very peculiar." He married a woman who became insane, and had five children. One was an inebriate. All had the tremor.

(7) The seventh son was intemperate, was twice married, and had nine children, all having the tremor. One of the children, a daughter, had epilepsy. She herself has had four children, one of these had decided tremor. The three oldest had epilepsy, two dying in eclamptic attacks.

(8) The eighth child, a daughter, is still living, she has never married. She was always peculiar, and has the tremor markedly.

(9) The ninth child, a son, died childless. He had no tremor.

SUMMARY OF HISTORY OF FAMILY A.—*Grandfather* very intemperate, but never insane.

Father insane, but not intemperate. He had nine children. They all had the tremor.

One son insane from early life.

One, a lover of strong drink, but not a confirmed inebriate.

Two were very peculiar, and would be called now-a-days "cranky."

Two died without marrying.

All grew to adult life and most of them lived to advanced old age. Several showed intelligence and mental activity much above the average.

These nine, or rather seven of them, produced thirty-four children; and all of these that lived to grow up showed the family tremor, through in varying degrees. In two branches insanity appeared, in one a member was intemperate, and in one branch epilepsy developed in the daughter and grandchildren. The tremor also appeared in one of these latter. I cannot learn whether it has developed in other branches among the grandchildren, but, if so, it is much less marked, and the opinion in the family is that the tremor is dying out. The total number of cases in the family is forty-five.

In none of these cases did the tremor increase upon them as they grew older. It is a curious coincidence that the family early embraced

spiritualism, and that that has passed through the different generations along with the tremor.

GENEALOGICAL TABLE SHOWING THE DEVELOPMENT OF THE HEREDITARY TREMOR IN FAMILY A.

GENERATION I.	II.	III.	IV.	V.
Grandfather, intemperate, and a tobacco user. No tremor.	Aunt, insane.			
	Father, temperate, insane; no tremor.	1st child, daughter, *tremor.* Married.	1st, son, insane, *tremor.* 2d, " *tremor.* 3d, " " 4th, " " 5th, daughter, *tremor.* 6th, " " 7th, " " 8th, " " 9th, " "	
		2d child, son, insane at 20 ; died at 80 ; *tremor.* Single.		
		3d child, daughter, *tremor,* Married.	1st, son, insane ? *tremor.* 2d, daughter, " 3d, "	
		4th child, son, *tremor,* Married.	1st, son, *tremor.* See hist. 2d, " " 3d, daughter, *tremor.* 4th, " " 5th, " "	
		5th child, son (see history), *tremor.* Married.	1st, son, *tremor.* 2d, " " 3d, " "	
		6th child, son ; very peculiar ; *tremor* Married.	1st, son, intemp. *tremor.* 2d, " *tremor.* 3d, " " 4th, " " 5th, " "	
		7th child, son ; intemperate. Married.	1st, son, *tremor.* 2d, " " 3d, " " 4th, daughter, *tremor* and epilepsy. 5th, daughter, " 6th, " " 7th, " " 8th, " " 9th, " "	1, epilepsy, *tremor.* 2, " 3, " 4, 1 year old.
	Aunt.	8th child, daughter, "peculiar," *tremor.* Single.		
		9th child, son, *tremor.* Single.		

CASE II.—Through the kindness of Dr. Couland, of Brattleboro, Vt., I am able to give an account of the tremor occurring in its second generation.

The person examined is also a watchmaker and jeweller, and an excellent one. He is about forty years of age and married. His health has been good, his habits temperate, and he has never had any other nervous disorder than the one to be described. He is a man of nervous temperament, but quiet in manner and habits.

His tremor began in early childhood, and no cause other than heredity is assigned. It is bilateral and affects his arms chiefly. Occasionally there is tremor of the orbicularis on the right side (perhaps from wear-

ing his jeweller's glass ?). He has also nystagmus, but never tremor of tongue, or lips, or neck muscles. The tremor has not, he says, progressed, and he says that it does not interfere with his work, though Dr. Couland seems to think that occasionally it does. It probably is annoying because it requires an extra effort to steady the hand. The patella tendon-reflex is decidedly exaggerated.

He does not suffer from rigidity, cramps, or neuralgia. I have long personally known the patient in previous years, and have seen him at his work. His tremor is fine, like that of the preceding generation.

We may possibly have a developing organic trouble in this case, but the family history is against it.

I have fortunately been able to secure evidence sufficient to show that hereditary tremor is not a freak confined to the family just described.

I have the records of a second family in which there were three cases, and of a third family in which there were two. Two of the cases in the second family I have seen, and, indeed, have personally known for a long time.

FAMILY B.—In this family the tremor is found in only three persons, an uncle and two nephews, on the maternal side. The parents are both healthy, and have been temperate and regular in their habits.

The children consisted of three sons and a daughter. One son was a person of irregular habits, and died in early manhood. He had no tremor. The other two have had the tremor from childhood, but no other nervous disturbance. The one who suffered from the tremor most had, however, indulged a good deal in tobacco and alcohol. The details of his case were as follows:

CASE I.—He is a man of about thirty-five years of age, of strong physique, a carpenter by trade. He is of nervous temperament, quick, and intelligent. Has had no fits or nervous disorder other than the tremor. This began in infancy, and has been somewhat worse than it is at present. This, doubtless, was when he had been dissipating. It does not interfere with his work as a carpenter, but at times it is not perfectly under control, and has interfered with his writing and eating. It affects his arms mainly, is very fine in character, and constantly present. He has no nystagmus or speech disturbance. His deep reflexes are a little exaggerated. It is a tremor that does not increase or cease on voluntary motion, and is under brief control of the will.

CASE II.—The brother is a man of over forty years of age, of large, powerful build, and robust health. He is a business man of unusual ability, and a man of amiable disposition and excellent moral character, and temperate habits. He has always had good health and suffered from no intercurrent nervous disorder. His tremor began in early childhood, without known cause. It is much slighter in amount than in the brother, and he hardly notices it except that in writing sometimes he has to steady his hand by voluntary effort; yet he can, as a rule, write a perfectly smooth hand. Whatever makes him nervous increases the tremor. It has now lasted over thirty years without any increase. He has several healthy children, who have no tremors. There is no nys-

tagmus, and the knee-jerk is normal. The tremor resembles his brother's in fineness, and in its affecting the upper extremities chiefly. It ceases during sleep.

FAMILY C.—Of this family I have been able to get very few details, and there is some doubt as to the hereditary character of the tremor.

CASE I.—James M., aged fifty-five. He came to my clinic at the Post-graduate School suffering from a tremor which presented the general characters of that of paralysis agitans. He said that he had always had the tremor since he was a boy, it had always been more severe on the right side. The head and eyes were not affected.

The patient stated that his uncle had been affected in the same way, but still more severely. In the uncle's case the head was affected.

THE GENERAL FEATURES OF HEREDITARY TREMOR.

The tremor in all the foregoing cases bears a general clinical resemblance. It begins in infancy or childhood, sometimes being brought out by an infectious fever. It continues without progressing in severity during a lifetime, which it does not shorten. The family history will reveal neuroses or psychoses. The upper extremities are most noticeably affected, but it may involve the head, neck, eye, laryngeal, or, in fine, any of the voluntary muscles. It ceases during sleep, and can be inhibited temporarily by the will. Everything that produces excitement or nervousness increases the tremor. It may be barely noticeable, except under some excitement, or the influence of alcohol or tobacco. It does not interfere with delicate coördination. It neither stops nor increases on ordinary voluntary movements; in this respect differing from the tremors of paralysis agitans, or multiple sclerosis. There may be with it slight contractures of the fingers, also developed early and non-progressive, but there are none of the forced movements, rigidity, paresis, subjective sensations, or vasomotor disturbances of paralysis agitans, while the head and neck are not so much affected, as in senile tremor. The tendon-reflexes may or may not be exaggerated.

The tremor is most nearly like that occurring in neurasthenic states, or from poisons, only there is no general nerve exhaustion, and no muscular weakness.

It is associated with other neuroses or psychoses, such as insanity, inebriety, and epilepsy, and also with examples of unusual talent or intellectual vigor. And it illustrates the fact that a neuropathic taint in a family may develop as a disease, or as some brilliant mental endowment. The tremor has a tendency in successive generations to die out. It may be directly hereditary or only of a family type, occurring in uncle and nephew. It may occur in one generation only as a congenital neurasthenic tremor. It is entirely distinct from paralysis agitans, in the fact of its heredity, non-progressiveness, and absence of any other neuromotor or vasomotor symptoms. It differs symptomatologically also

from senile tremor, which latter generally affects first and entirely the head and neck.

I have not thought it worth while to discuss its pathology. It is undoubtedly neuropathic, not myopathic, and in the following classification of tremors I should place it among the neurasthenic:

CLASSIFICATION OF CHRONIC TREMOR.

Organic

A. Due to inflammatory sclerotic,
- post-hemiplegic tremor.
- tremor in spasmodic tabes.
- tremor in multiple sclerosis.

neoplastic, or
- tremor from tumors in brain or cord.

degenerative changes affecting the motor tract from cortex to anterior cornu,
- paralysis agitans.
- senile tremor.

B. Due to same changes affecting motor nerves or muscles,
- neuritic tremor.
- fibrillary myotrophic tremor.

Functional

Toxic tremors,
- lead, alcohol, tea, tobacco, mercury, etc.

Neurasthenic tremor,
- acquired — e. g., phthisical, syphilitic, professional.
- hereditary and congenital.

THE DYSPNŒA OF ASTHMA AND BRONCHITIS:

ITS CAUSATION, AND THE INFLUENCE OF NITRITES UPON IT.[1]

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DYSPNŒA, or difficulty in breathing, is one of the most common of symptoms in disease, and especially in disease of the respiratory apparatus, with each of the many pathological affections of which it may be associated. My remarks, however, shall be restricted to its manifestation in asthma and bronchitis. In the former disease it presents itself as an urgent orthopnœic breathlessness, and in the latter as a sensation of constriction or weight in the chest, and a difficulty in the performance of respiration. The breathlessness, or dyspnœa, in each of these diseases is, no doubt, dependent on defective aëration of the blood, caused either by insufficient contact of air with the bloodvessels in the pulmonary vesicles, or by insufficient movement of air in the air-passages. Insufficient contact occurs, for example, when the air vesicles are filled with liquid or semiliquid contents; and it is clearly a cause that is to some extent productive of the dyspnœa of bronchitis in many of its forms and stages, as well as of the dyspnœa of several other diseases of the

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[1] Read at a meeting of the Medico-Chirurgical Society of Edinburgh, on the 6th of April, 1887.

lungs. Insufficient movement of air occurs when the calibre of the air-passages is reduced, or when from any cause the expansion or retraction of the chest is impeded; and this imperfect movement of air is usually recognized as a cause of the dyspnœa that occurs in both asthma and bronchitis.

ASTHMA.

The symptoms of asthma are, indeed, typically those that are to be associated with imperfect movement of air. They have been thus described by Riegel:[1]

"The patient having gone to bed perfectly well, is suddenly awakened in the night, while sleeping quietly, by an intense sense of oppression and anxiety. Breathing is very laborious, and the respiration is attended with audible whistling and rattling, and the dyspnœa rapidly increases to an excessive degree. The cyanosis increases from minute to minute, the face becomes bluish-red and turgid, the eyeballs protrude, the patient supports himself on both arms to struggle powerfully for air, and the face becomes bathed in perspiration. The patient can no longer get his breath in the recumbent position, and often assumes the most varied attitudes in order to appease in a measure his craving for air. . . . Soon the patient hurries to the window to struggle for a mouthful of fresh air. In spite of all this, he does not appease his craving for air, even by the forcible action of all his auxiliary muscles. The paroxysm continues at its height for a long time—one, two, or more hours—and then it gradually subsides. The respiration becomes easier again, the cyanosis disappears, the patient gradually feels freer and freer, and then drops off into a quiet, deep, uninterrupted sleep."

Now, what is the cause of this intense and distressing dyspnœa? No anatomical lesions are found which are sufficient to account for it. It is regarded as a functional disorder produced by alterations in normal physiological conditions, or by temporary structural changes which disappear with the asthmatic paroxysm.

Speculation has been active, however, in advancing hypotheses regarding the nature of the functional or temporary structural disturbances which so obviously produce an obstruction to the movement of air along the respiratory passages. Setting aside the theories that were originated previously to the discoveries of Lænnec and Auenbrugger in physical diagnosis, when asthma was a term applied not only to pulmonary dyspnœa, but also to the dyspnœa of diseases of the heart and larger blood-vessels, of the pleura, glottis, stomach, and other organs and parts of the body remote from the lungs, it is probable that the first certain and firm basis of knowledge as to its causation was supplied by the demonstration by Reisseissen,[2] Prochaska, and Kölliker, of the existence of a muscular structure in the bronchi. The demonstration of the contractile power of this muscular structure, by Williams[3] and Longet,[4] amply confirmed

[1] Ziemssen's Cyclopedia of the Practice of Medicine, 1877, vol. iv. p. 557.
[2] Ueber den Bau der Lungen Berlin, 1822.
[3] Transactions of the British Association for the Advancement of Science, 1840, p. 411.
[4] Comptes Rendus des Sciences, 1842, t. xv. p. 592.

by the subsequent experiments of Paul Bert[1] and others, led to a revival of the old and, for a time, discredited view, that asthma is produced by a spasmodic affection of the muscles and nerves of respiration. The asthma convulsivum of Willis then became the asthma of bronchial spasm of Cullen, Romberg, Bergsen, Trousseau, and Salter; and for more than half a century was the generally accepted doctrine, notwithstanding the enunciation of other theories, usually of a purely speculative character, such as those of Todd, Brée, Budd, Walshe, and others.

The most formidable attacks made on the theory of bronchial spasm, however, were probably those of Wintrich, in 1854, and of Weber, in 1872; as the important hypothesis of Leyden,[2] that the asthmatic paroxysm is produced by irritation of the vagus terminations in the bronchi, by minute sharp-pointed crystals, involves as an explanation of the paroxysm a reflex spasm of the bronchial muscles.

Wintrich[3] denied that spasmodic contraction of the bronchi is possible, and maintained that the only explanation consistent with the phenomena, is to be found in tonic spasm of the diaphragm alone, or of the diaphragm and muscles of respiration together. He was led to adopt this theory from the results of some experiments which appeared to show that the bronchi did not contract under stimulation, and from a belief that the enlargement and hyper-resonance of the lungs, which nearly all observers had recognized during the paroxysm of asthma, could not be explained by spasm of the bronchial muscles. His opinions were supported by Bamberger,[4] who further pointed out that in a few cases of asthma the lower limit of hepatic dulness remains unchanged during both expiration and inspiration, at the line of deep inspiration. Wintrich's opinions and statements have not remained unchallenged. The most damaging criticisms they have sustained have been from Biermer,[5] who justly occupies the position of being one of the ablest supporters of the old theory that asthma is caused by spasm of the bronchial muscles. Biermer has the further merit of having prominently shown that asthma is characterized by expiratory dyspnœa, which distinguishes it from the dyspnœa of obstruction in the larger air-passages, where the embarrassment is more decided during inspiration. He endeavors to prove that spasm of the bronchi is able to cause enlargement of the thorax, increased percussion resonance over the lungs, descent and restricted movements of the diaphragm, and relative difficulty of expiration as contrasted with

[1] Leçons sur la Physiologie comparée de la Respiration, 1870, p. 379.

[2] Virchow's Archiv, 1872, Bd. 54, p. 324

[3] Virchow's Handbuch der speciellen Pathologie und Therapie, 1854, Bd v; und Krankheiten der Respirationsorgane, Erlangen, 1855–57.

[4] Wurzburger medicinische Zeitschrift, 1865, Bd. vi.

[5] Ueber Bronchialasthma, Sammlung Klinischer Vorträge, 1875, 12, p. 39.

inspiration; and thus he apparently succeeds in advancing a sufficient explanation of the phenomena of asthma.

The other most formidable opposition which the doctrine of bronchial spasm has encountered, may, for convenience, be associated with the name of Weber, although his theory seems to be but a modification of that previously advanced by Traube. Weber[1] ascribed the asthmatic attack to a sudden congestive thickening of the bronchial mucous membrane through the agency of vasomotor nerves, and he compared the changes that were thereby produced to the local swelling and abnormal secretion of the nasal mucous membrane, which, in many persons, are produced by catarrh. In so far as the causation of the asthmatic dyspnœa is concerned, this theory also agrees with the old supposition that the retrocession of certain cutaneous eruptions is productive of asthma, revived in more modern times by Waldenburg,[2] in his so-called herpetic asthma, and also by Sir Andrew Clark,[3] in a paper published last year on the theory of bronchial asthma.

The three explanations of the production of the asthmatic paroxysm, which seem at the present time to be maintained more than any others, are, therefore, embodied in the theory of bronchial spasm, in the theory of spasm of the diaphragm, associated, or not associated, with spasm of the other ordinary or extraordinary muscles of respiration, and in the theory of constriction of the bronchial tubes by swellings of a hyperæmic, herpetic, or urticaria-like character.

The existence of these contending theories is a sufficient proof of the difficulties that are encountered in explaining the dyspnœa of asthma. The observation of symptoms, the assistance that has been derived from advancements in the physiology of the respiratory and nervous systems, and the great increase in knowledge of the pharmacology of the substances that are used as remedies, do not appear to have entirely solved the difficulties. No doubt the second theory, that of Wintrich, has sustained from Biermer a more damaging criticism than either of the two others has yet met with; and it may be regarded as demonstrated that spasm of the diaphragm, combined or not combined with spasm of the muscles of respiration, is not the essential or primary cause of the symptoms of asthma, however such spasm, in some cases and in some degrees, may occur as a secondary condition during the paroxysm. That able and trained observers are divided in their belief as to the correctness of the other two theories, is shown by the statement of Dr. Geddings,[4] of America, that the retrocession of cutaneous eruptions as a cause of asthma, has of late years "found but few advocates among intelligent physicians;"

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[1] Ueber Asthma Nervosum   Tageblatt des 45, Versammlung deutscher Naturforscher und Aerzte zu Leipsic, 1872, p. 159.

[2] Berliner klin. Wochenschrift, 1873.

[3] The American Journal of the Medical Sciences, January, 1886, vol. xci. p 104

[4] Pepper's System of Medicine, 1885, vol. iii. p. 193

and of Riegel,[1] that the severer grades of asthma " can be explained by the mere tumefaction of the mucous membrane, seems to me improbable;" while on the other hand, Sir Andrew Clark[2] affirms "that the bronchial spasm theory of asthma is either inadequate to explain the phenomena of the paroxysm, or is not in harmony with the present state of physiological and pathological knowledge."

It seems obvious that some additional facts are required before the truth can be arrived at. The obtaining of such facts is desirable, not merely because of the interest that is attached to the elucidation of the pathogenesis of this as of all diseases, but much more importantly, on account of the basis that would thereby be gained for the proper application of remedies. A very different treatment, for example, would be suggested for the cure of a dyspnœa dependent on stenosis of the bronchial tubes caused by hyperæmia, from the treatment of a dyspnœa dependent on stenosis caused by spasm of the bronchial muscles.

In considering the problem that is presented, we may assume that stenosis of the bronchial tubes is present. It is, indeed, impossible to overlook the significance of what are, after all, the most constant, as well as the most prominent, of the physical signs that accompany the asthmatic paroxysm. On auscultating the chest, there are heard râles of a snoring, cooing, and whistling character, unaccompanied during a part of the paroxysm, in most cases, by any moist sounds, and, in not a few cases, heard during the entire paroxysm unassociated with any moist sound, and even terminated, as Graves[3] has pointed out, without any expectoration whatever. The bronchi in which these sounds occur are furnished with bloodvessels, which might dilate and produce hyperæmic swellings; they are also furnished with muscles, which might contract spasmodically and here and there produce constrictions. The possibility of the latter causation of constriction cannot, I think, admit of a doubt, since the discoveries of the earlier investigators have been so amply confirmed by Paul Bert, and by Graham Brown and Roy.[4]

It occurred to me that in deciding between the two theories of the causation of the asthmatic paroxysm which seem, at present, to hold the field, some assistance might be derived by determining if the auscultatory phenomena to which I have referred can be modified, and simultaneously the dyspnœa reduced or removed by the action of any pharmacological agent that markedly influences the contractility of muscle, and especially of non-striped muscle. It is well known that many substances relieve the dyspnœa of asthma—such substances, for example, as atropine, morphine, and chloral—but their influence upon the auscultatory phenomena has not, so far as I know, been investigated. In the case

[1] Ziemssen's Cyclopedia of the Practice of Medicine, 1877, vol. iv. p. 554.   [2] Loc. cit., p. 110.

[3] Clinical Lectures on the Practice of Medicine, 1864, p. 507.

[4] The Journal of Physiology, vol vi., 1883 ; appendix, p. xxi.

of the substances I have mentioned investigation of this kind is not, indeed, likely to afford distinct or incisive results, as their influence on the dyspnœa is uncertain, and, usually, but slowly produced, and as they involve in their sphere of action many parts of the nervous system; while it has not been proved that independently of this involvement they influence the contractility of non-striped muscle in a very distinct or powerful manner.

In the absence of evidence of the existence of any substance that rapidly and distinctly modifies the contractility of the bronchial tubes, the analogy in structure and nerve relationship between the bloodvessels and the bronchial tubes suggested that the most appropriate substances to be employed for the purpose I have stated would be those which are capable of modifying the contractility of bloodvessels by direct contact with them. Nitrite of amyl has been shown to possess this action, and the probabilities are in favor of its being possessed also by other nitrites and by substances that have essentially the same pharmacological action.

It seemed advisable to ascertain positively, in the first place, if all the chief nitrites possess this action, and, if so, to what extent they severally exert it. I was fortunate in inducing Mr. Sillar to undertake a series of experiments having these objects in view. The experiments entailed a large amount of patient observation, and they were made with great care and with every precaution to insure accuracy. The mode of procedure was as follows: The brain and spinal cord having been destroyed in a frog, the heart of the animal was exposed and all the bloodvessels connected with it, except the left aorta and the veins opening into the sinus venosus were ligatured. A canula was then tied into the left aorta and connected with a tube leading to reservoirs, placed always at the same height above the frog. The contents of any one of the reservoirs could be caused to flow into the aorta by opening or shutting clamps that were placed on the tubes leading from the reservoirs. The rate of flow of a saline solution through the entire vascular system of the animal was first ascertained, and then a solution of the same saline containing a given quantity of a nitrite was substituted for the simple saline solution, and its rate of flow through the bloodvessels of the animal was ascertained. By this procedure the effects of contact of any strength of a solution of nitrite upon the bloodvessels could be exactly determined; for if the rate of flow were diminished, it would be shown that the bloodvessels had been caused to contract, whereas, if the rate of flow were increased, it would be shown that the bloodvessels had been caused to dilate. The nitrites that were tested were nitrite of amyl, nitrite of ethyl, and nitrite of sodium. Without entering into details, I will content myself with stating that the general result was that each of these nitrites produced by contact a decided dilatation of the bloodvessels, in a few instances so great that the passage through them of the solution was

doubled in its rate; and that dilatation occurred, usually, in less than a minute after the nitrite had entered the bloodvessels, and was continued for periods varying from thirty to ninety minutes. Nitrite of sodium was found to be the least powerful, and nitrite of amyl the most powerful dilator of bloodvessels, nitrite of ethyl occupying an intermediate position. The difference is indicated by the statement that whereas a solution of 1 in 100,000 of nitrite of amyl was sufficient to cause a marked increase in the rate of flow through the bloodvessels—indicating a distinct dilatation of their walls—it was necessary to employ a solution of 1 in 10,000 of nitrite of sodium to produce a nearly equal effect.

The action of nitroglycerine was not examined in the same manner, as the conditions probably required to effect its conversion into a nitrite, which exist in the blood of a warm-blood animal, could not be obtained in the saline solutions substituted for the blood in these experiments.[1]

A few experiments were, however, also made with alcohol and chloroform. Somewhat concentrated solutions of the former produced dilatation; but no constant results were obtained with chloroform, the evidence, on the whole, pointing to an absence of any dilatation under the contact of this substance with the bloodvessels.

It was thus shown that very dilute solutions of nitrites, apart altogether from any influence they may exert on structures at a distance, produce dilatation of the walls of bloodvessels as a result of contact with them. If they could be shown likewise to modify in asthma the condition of the bronchial tubes, whose anatomical relationships to bloodvessels are so marked, it is obvious that an important step would be gained in deciding which of the theories of the causation of the asthmatic paroxysm is the correct one.   In the absence of any direct experimental method for ascertaining the state of the bronchi, and especially for estimating the changes that might be produced in them by medicinal agents, during an asthmatic paroxysm, it seemed to me that the observation of the auscultatory phenomena, which have, by nearly universal consent, been explained by stenosis of the bronchi, would be likely to supply important evidence.

My first observation was made in 1880, on a patient, Jessie L., twenty-two years of age, suffering from asthma and from excitement of the circulation and slight enlargement of the thyroid gland. She was one of three sisters who presented, in various forms, the symptoms of exophthalmic goitre. The dyspnœa had lasted for several weeks; it was most severe at night, but occasionally manifested itself during the day. When the observation was made (August 14, 1880) she was sitting up in bed suffering from great breathlessness. The pulse was 100 and the respira-

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[1] Since this sentence was written, Dr. Atkinson, in the course of an elaborate research on nitrites, made in my laboratory, has found, in experiments similar to those above described, that nitroglycerine in very dilute solutions powerfully dilates the arteries and capillaries. This local action of nitrites has also been recently shown to occur in warm-blooded animals by R. Kobert (Ueber die Beeinflussung der peripheren Gefässe durch pharmakologische Agenten.   Archiv für experimentale Pathologie und Pharmakologie, Bd. 22, 1886, p. 77).

tions 28 per minute. On auscultating the front of the chest, it was found that expiration was markedly prolonged, and that both inspiration and expiration were accompanied with cooing, whistling, and creaking râles, and with occasional medium crepitations.

At 1 55′ P.M. she began to inhale 10 minims of nitrite of amyl placed on blotting-paper at the bottom of a small glass tumbler, and she continued inhaling for about one minute and fifty seconds, the chest being continuously auscultated during the observations.

At 1 56′ 30″, the face was flushed, and the pulse was 120 per minute.

At 1 57′, the cooing, whistling, and creaking râles had entirely disappeared, and the patient spontaneously remarked that her breathing was easier, and that the sensation of tightness had disappeared from the chest.

At 1 58′, the râles had returned, but as yet to only a slight extent; the breathing had become more difficult, and the pulse was 96 per minute.

At 2 4′, the pulse was 96, and the respirations 28 per minute, while the breathing was as difficult, and the râles as loud and continuous as they had been before the inhalation.

From 2 6′ to 2 7′ she again inhaled nitrite of amyl.

At 2 6′ 30″, the face was flushed.

At 2 6′ 45″, the flushing had increased, the râles in the chest had entirely disappeared, and the patient stated that the breathing was perfectly easy.

At 2 6′ 50″, the pulse was 122, and the respirations 30 per minute, while the breath sounds were still unaccompanied with râles.

At 2 9′, cooing sounds were occasionally heard.

At 2 11′, the cooing sounds continued, but the breathing was still easy.

At 2 12′, the breathing was embarrassed, and cooing, creaking, whistling, and crepitant râles were audible, though they were not so continuous as immediately before the second inhalation.

At 2 19′, the pulse was 95, and the respirations 30, while the auscultatory phenomena and the difficulty of breathing were as pronounced as before the administration of nitrite of amyl.

From 2 22′ to 2 23′ she, a third time, inhaled nitrite of amyl.

At 2 22′ 30″, the face was very red.

At 2 22′ 50″, the pulse was 126, and the respirations 23 per minute, while the râles had entirely disappeared, and the breathing was again, in her own words, " quite easy."

At 2 25′, the pulse was 90, and the respirations were 28 per minute ; the redness of the face had completely disappeared, the breathing was slightly embarrassed, and cooing and creaking râles were occasionally heard.

At 2 28′, the breathing was as much embarrassed as it originally had been ; and with the return of dyspnœa there was a complete return of the auscultatory phenomena that had been present before the first inhalation of nitrite of amyl.

There had been no cough or expectoration from the commencement to the termination of the observations. The patient stated that the breathlessness and sense of tightness in the chest had been entirely removed for a time by the inhalations, and the only unpleasant effect they seem to have produced was a briefly lasting sense of fulness in the head.

To illustrate more clearly the relationship between the effects on the

asthma and on the circulation, I would refer to the pulse-tracings taken frequently during the observations.   They show, in a very remarkable manner, a coincidence between the fall of blood tension and the cessation of the dyspnœa and auscultatory phenomena, and also between the return to the original state of the blood tension and the reappearance of the dyspnœa and auscultatory phenomena.   As the lowered blood tension is accompanied with acceleration of the heart's contractions, it can only be accounted for by the dilatation of bloodvessels.
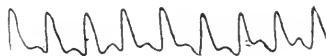
FIG. 1.

Before first inhalation.   Pulse 100, respirations 28 per minute.   Breathing much embarrassed, râles abundant.

Nitrite of Amyl Inhaled during nearly Two Minutes.

FIG. 2.

Two minutes after inhalation commenced.   Pulse 120 per minute.   Breathing quite easy.   No râles.

FIG. 3.

FIG. 4.

One minute after inhalation ceased.   Pulse 96 per minute.   Breathing slightly embarrassed.   Râles occasionally heard.
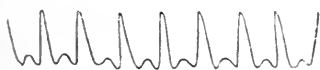
Seven minutes after inhalation ceased.   Pulse 96, respirations 28 per minute.   Breathing embarrassed.   Râles nearly continuous.
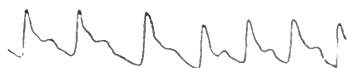
Second Inhalation of Nitrite of Amyl during Two Minutes, begun Nine Minutes after the first Inhalation ceased.

FIG. 5.

FIG. 6.

Fifty seconds after second inhalation commenced.   Pulse 122, respirations 30 per minute.   Breathing perfectly easy.   No râles.
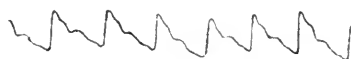
Two minutes thirty seconds after second inhalation ceased.   Pulse 96, respirations 28 per minute.   Breathing easy.   Occasional râles.

FIG. 7.

FIG. 8

Eight minutes after second inhalation ceased.   Pulse 96, respirations 30 per minute.   Breathing embarrassed.   Râles more frequent.

Twelve minutes after second inhalation ceased.   Pulse 95, respirations 30 per minute.   Breathing embarrassed.   Râles abundant.

Third Inhalation of Nitrite of Amyl during One Minute, begun Fifteen Minutes Thirty Seconds after Second Inhalation ceased.

Fig. 9.

Fig. 10.

Fifty seconds after third inhalation commenced. Pulse 126, respirations 23 per minute. Breathing quite easy. No râles.

Two minutes after third inhalation ceased. Pulse 90, respirations 28 per minute. Breathing easy. Râles only rarely.

Fig. 11.

Eighteen minutes after third inhalation ceased. Pulse 88, respirations 28 per minute. Breathing much embarrassed. Râles very abundant.

Several observations were made on other patients suffering from asthmatic dyspnœa, by administering nitrite of amyl or nitrite of ethyl by inhalation. The results generally corresponded very closely with those described in the above observation.

It is apparent that, although the effects are of the greatest significance in regard to one of the main objects for which the observations had been made, they were, at the same time, of a very transient duration. Before any further observations had been made on asthma, I had, however, succeeded in collecting a number of facts which rendered it probable that effects of a more lasting description, and therefore of greater value to therapeutics, might be obtained were the nitrites administered through the mouth. The observations in which this method of administration was followed derive an additional importance from the circumstance that they were made on patients during extremely severe dyspnœa, of a markedly orthopnœic character. These severe attacks occurred only during the night or the early hours of the morning. The occasions of their occurrence were somewhat irregular, so that it could not be anticipated with certainty that they would occur on any special night. It was, therefore, necessary to entrust the observations to those who could, at any moment, make them. They were kindly undertaken by Dr. Vaughan, who was at the time acting as my resident physician at the Royal Infirmary, and by Mr. Tofft, a clinical clerk in my wards, who remained in the hospital during several nights for the purpose. Both gentlemen had previously assisted me in many observations of this kind, and they were, therefore, thoroughly qualified to undertake the work.

OBSERVATION I.—An interesting and complete series of observations was made on a man, Hugh G., forty years of age, who had suffered from asthma for four years, and had been an inmate of the Royal Infirmary for three months. As one generally finds in cases of so long duration, emphysematous changes had been produced in the lungs, and symptoms of bronchitis were also present. The emphysema was, however, only moderate, and the bronchitis slight, and frequently, for days, the symptoms of the latter were entirely absent. His sputum was usually tenacious and gelatinous, and small in quantity. Several times in each week his sleep was interrupted by severe attacks of breathlessness, which lasted from an hour and a half to three hours, and sometimes occurred twice or even thrice in one night. During the attacks the patient either sits up in bed or walks about the ward, sitting down at times to recover strength. He struggles violently for breath, inspiration and expiration succeed each other rapidly for a short time, then expiration becomes brief, the chest seems to become rigid in full inspiration, violent respiratory efforts are made with but little change in the volume of the thorax, and the extraordinary muscles of respiration are brought into play with but little result. After this state has lasted for some time, endeavors are made to cough, which are at first unsuccessful, but after a number of gasping and strained inspirations and expirations, he at last succeeds in coughing, and bye and bye a small quantity of frothy and tenacious sputum is expectorated, when the patient either at once or soon after obtains relief. During the greater part of the paroxysm, the face and neck, and to a less extent the chest, are much congested.

OBSERVATION II.—On the 30th of December, 1886, a paroxysm began at about 4 30′ A. M. When the patient was examined, eight minutes afterward, he was sitting up in bed holding his sides, and so breathless that he could scarcely speak. The veins of the neck were turgid, and the labored breathing was accompanied with loud wheezing audible in the corridor of the ward at a distance of at least forty yards from the patient. The pulse was 120 per minute and feeble, and the respirations were 36 per minute.

At 4 41′, both sides of the chest were auscultated, with the result that the ordinary breath sounds were everywhere supplanted, during both inspiration and expiration, by continuous rhonchi and sibili. The time-relation of inspiration to expiration was $1 : 1\frac{1}{2}$.

At 4 43′, five minims of nitrite of amyl in two drachms of water were given to the patient.

At 4 43′ 30″, at the left side of the chest, the rhonchi and sibili had markedly diminished ; at the right side there were no accompaniments whatever, with the exception of a few medium crepitations at the end of expiration. The face, hands, and chest were distinctly flushed.

At 4 44′, the pulse was 96, and fuller, and the respirations were 24 per minute. The patient said that his breathing was greatly relieved.

At 4 45′ 30″, the breathing at the right side was absolutely clear and vesicular ; and at the left side there was only a slight sibilus during inspiration, expiration being free from accompaniments. The wheezing had by this time practically disappeared.

At 4 50′, the time-relation of inspiration to expiration was $1\frac{1}{2}$ to $2\frac{1}{2}$.

At 4 51′, there were no accompaniments whatever at any part of the chest either during inspiration or expiration, except a few medium crepitations that occurred at varying intervals and at both sides.

At 4 53', at the right side, the breath sounds continued clear, except that now and then a distant rhonchus was heard at the beginning of expiration ; at the left side, however, there were sibili throughout expiration and rhonchi during a part of inspiration.

At 4 55', the patient stated that his breathing had become a little more difficult than it had been a short time before, and he referred the difficulty to the upper half of the sternum.

At 4 58', the pulse was 90 and the respirations were 22 per minute, and the former was irregular in the character of the pulsations.

At 5 A. M., at the right side, there were no accompaniments excepting medium crepitations ; and at the left side there was only a brief sibilus, sometimes with inspiration and at other times with expiration.

At 5 8', the patient said he felt perfectly well.

At 5 14', at the right side, there was a short rhonchus at the beginning of expiration, but no accompaniment whatever at the left side. The patient was now lying on the back no longer propped up. He seemed quite free from any difficulty in breathing and he was apparently desirous to be allowed to sleep.

He was again seen at 6 10' when he seemed to be, and expressed himself as being, free from dyspnœa, but on auscultating the chest a few sibili and rhonchi were occasionally heard.

On the following day the patient was very well. His breathing was unembarrassed, but he experienced a little palpitation, and he said he had found it necessary to empty his bladder more frequently than he usually did.

OBSERVATION III.—On the same patient the following observations were made with nitrite of ethyl (nitrous ether).

On the 8th of January, 1887, difficulty of breathing began to be experienced soon after 2 A. M.

At 3 15' A. M., the patient was propped up in bed, breathing with great difficulty and showing signs of much distress. This difficulty was felt both in the act of inspiration and of expiration, but it was rather worse in that of expiration, or, as the patient described it, " it was worse to get the breath out." There was also loud wheezing. A small quantity of sputum had been expectorated, which was tenacious and of a yellowish color.

At 3 20', on auscultation, rhonchi and sibili were heard during inspiration and expiration over both sides of the chest, but rather louder over the right than the left side. The pulse was 96 and the respirations were 22 per minute. The relation of inspiration to expiration was $\frac{3}{4} : 1\frac{1}{2}$ on both sides.

At 3 26', ten minims of a 25 per cent. alcoholic solution of nitrite of ethyl, mixed with two drachms of water, were taken by the patient.

At 3 26' 30", patient said he was " not so ill."

At 3 28', at both the right and the left sides, there were rhonchi with expiration, sibili had disappeared, and no accompaniments were heard with inspiration. The time-relation of inspiration to expiration was even on the right side, 1 : 1 ; and on the left, $\frac{3}{4} : 1$.

At 3 31', the pulse was 89 and the respirations were 24 per minute.

At 3 35', at both sides, a short rhonchus was heard with inspiration, but nothing with expiration. There was also only slight wheezing, and the patient exclaimed, " I'm almost quite easy now."

At 3 36' 30", both sides of the chest were entirely free from accom-

paniments. The time-relation of inspiration to expiration was at the right side 1¼ : 1, and at the left side 1 : ¾.

At 3 41', the pulse was 72, the respirations were 24 per minute, and the breathing was still quite clear and free from accompaniments.

At 3 51', the patient remarked that he was " quite easy," and had " no difficulty in the least " with his breathing ; on auscultation no accompaniments were anywhere to be heard ; there was no wheezing ; and the time-relation of inspiration to expiration was 1 : ¾. The chest was frequently auscultated from this time until 4.50 A. M., and the breathing was always found to be soft and vesicular in character and to be entirely free from rhonchi or sibili, while during the whole of this time the patient remained entirely free from dyspnœa.

At 4 52', slight wheezing reappeared, the pulse was 72 and the respirations were 20 per minute ; and the time-relation of inspiration to expiration was, at the right side, 1 : 1½ ; and at the left side, ¾ : 1.

At 4 55', at the left side, a slight sibilus was occasionally heard on inspiration, but there were no accompaniments at the right side.

At 5 A. M., the auscultatory phenomena were the same as at the last note, but the wheezing was more audible, and expiration seemed slightly more prolonged. The patient coughed at this time, without expectorating, however.

At 5 11", at the right side, there was slight sibilus at the beginning of inspiration with loud rhonchus during expiration, and at the left side, while inspiration was clear there were rhonchi with expiration. The breathing was now a little embarrassed.

At 5 18', there were a few slight rhonchi and sibili, varying much in the time of their occurrence, at both sides of the chest. The patient at one time said the breathing " is quite easy," and at another that it was " a little difficult." The pulse was 78 and the respirations were 24 per minute. He was, however, lying in a normal position in bed.

These conditions remained unchanged until 5 25', when the observations were stopped.

OBSERVATION IV.—An observation with nitrite of ethyl was again made on this patient, on the 24th of January, 1887. On this occasion, the first symptoms of an asthmatic paroxysm began to show themselves soon after midnight.

At 12 35' A. M. the patient was sitting up in bed, supporting himself on both elbows, and breathing with great difficulty. He stated that this difficulty was more pronounced during expiration than inspiration. There was loud wheezing, audible in the corridor of the ward, at least thirty yards from the patient's bed. A little sputum had been expectorated, consisting of dark masses of a gelatinous substance.

At 12 40', on auscultation, it was found that at the right side there were numerous rhonchi and sibili with both inspiration and expiration ; and that at the left side, sibili were almost continuous through inspiration and expiration. The time-relation of inspiration to expiration at both sides was ¾ : 1¼. The pulse was 79, and the respirations were 30 per minute.

At 12 50', the patient received 10 minims of a 25 per cent. alcoholic solution of nitrite of ethyl in a little water.

At 12 51', he said, " the breathing is easier." At both sides rhonchi were heard during both inspiration and expiration, but there were no

sibili. The time-relation of inspiration to expiration was at the right side $\frac{3}{4} : \frac{3}{4}$, and at the left side $\frac{1}{2} : \frac{3}{4}$.

At 12 54′, the wheezing had become slight. The pulse was 75 and the respirations were 24.

At 12 57′, the breath sounds were at both sides quite clear, almost vesicular in character, and entirely free from accompaniments. The time-relation of inspiration to expiration was at the right side $1 : \frac{3}{4}$, and at the left side $\frac{3}{4} : \frac{3}{4}$.

At 1 A.M. there was no wheezing, and the breath sounds were everywhere vesicular in character. The patient was able to lie down in a normal posture. The pulse was 72, and the respirations were 20 per minute.

At 1 6′, at the right side, an occasional slight and distant rhonchus was heard at the end of expiration, and on the left side a similar sound at the commencement of inspiration. Slight wheezing was also audible.

At 1 11′, the conditions were the same as at 1 6′.

At 1 14′, patient said he felt "quite free" in his breathing. The pulse was 72, and the respirations were 20 per minute.

At 1 18′, the patient said the breathing was "soft as if it was oiled." There were no accompaniments on auscultation; the wheezing had quite disappeared; and the time-relation of inspiration to expiration was, on both sides, $1\frac{1}{2} : 1\frac{1}{2}$.

The patient was not again examined until 2 A.M. In the interval he had remained perfectly well, and free from any difficulty of respiration. On auscultation, the breathing was everywhere vesicular in character and without any accompaniment. The pulse was 64, and the respirations were 21 per minute. On the same day at 1 P.M., the breath sounds were also perfectly normal; there was no dyspnœa, and the time-relation of inspiration to expiration was $2 : 1\frac{1}{2}$.

OBSERVATION V.—This patient when suffering, on another occasion, from a severe paroxysm of asthma, was treated with nitrite of sodium. The paroxysm began to manifest itself at about a quarter to two in the morning of the 30th of December, 1886.

At 2 54′ A.M., he was sitting up in bed in great distress, suffering from a sense of great straining in the epigastrium, and he was wheezing as loudly as before the other observations that have been described. Sputum of a very tenacious character and somewhat blood-stained was being expectorated with great difficulty. The pulse was feeble, intermittent, and extremely varying in volume. Its rate was 84, and that of the respirations 30 per minute. The time-relation of inspiration to expiration was $1 : 2\frac{1}{4}$

At 3 A.M., there were heard on auscultation, at the right side, rhonchi throughout inspiration and expiration; and at the left side, coarse rhonchi with inspiration, and rhonchi and sibili with expiration. Sibili were apparently also being produced in the throat.

At 3 2′, ten minims of a 10 per cent. solution of nitrite of sodium, mixed with a drachm of water, were given to the patient.

At 3 3′, the right side was almost free from accompaniments, but at the left side there was heard a faint rhonchus at the end of inspiration, and an occasional faint sibilus at the end of expiration. Patient "feels a lot easier."

At 3 4′, wheezing was no longer audible, and the patient said he was

"quite easy." The pulse was 84 per minute, still intermittent, but a little fuller. The respirations were 30 per minute.

At 3 6', the time-relation of inspiration to expiration at the right side was 1 : $\frac{3}{4}$, and at the left side 1 : 1.

At 3 7', the patient said "I feel nothing at all." The breathing was quite soft and subdued at both sides, and there were no accompaniments at all.

At 3 8', there was slight wheezing in the throat, but the breath sounds over the lungs were perfectly normal and vesicular.

At 3 12', the patient was talking quite comfortably, and he stated that he had "no distress whatever."

At 3 13', a small quantity of tenacious sputum was expectorated, which "came quite easy."

At 3 15', the breath sounds were still quite free from accompaniments, except that a few crepitations were heard at the beginning of inspiration over the right lung. The time-relation of inspiration to expiration was at the right side 1 : $\frac{3}{4}$, and at the left side 1 : $\frac{1}{2}$.

At 3 17', the pulse was 72 per minute, and rather more intermittent than formerly, and the respirations were 26 per minute.

At 3 20', the patient continues to "feel nothing at all."

At 3 28', the breathing was soft on both sides without any accompaniment. The time-relation of inspiration to expiration was at both sides 1 : 1. The pulse was 79, and the respirations were 25 per minute.

At 3 51', the conditions were the same as at last note.

At 3 53', the breathing was still absolutely clear and soft. The time-relation of inspiration to expiration was at the right side $1\frac{1}{2}$: $\frac{1}{2}$, and at the left side $1\frac{1}{2}$: $\frac{1}{2}$.

At 4 7', the condition of respiration was the same.

At 4 26', the breath sounds were perfectly soft and normal. The pulse was 72, and the respirations were 21 per minute. The time-relationship of inspiration to expiration was at the right side $1\frac{1}{2}$: 1, and at the left side 1 : $\frac{3}{4}$.

The observations were now interrupted until 5 53' A.M., when it was found that slight wheezing was again audible, and that over both lungs occasional and slight rhonchi and sibili were present. The patient stated that about five minutes previously he felt tightness of the chest and wheezing "come on all at once."

At 5 56', there were faint sibili with both inspiration and expiration at the right side, and with inspiration alone at the left side. The pulse was 78, and the respirations were 20 per minute. The time-relationship of inspiration to expiration was at the right side 1 : 2, and at the left side 1 : $1\frac{1}{4}$.

At 6 5', the patient said "the breathing is getting tighter," and the breath is "worse to come up than go down." Over both lungs sibili were heard throughout inspiration, and the time-relation of inspiration to expiration was at both sides 1 : $1\frac{1}{4}$.

As the asthmatic condition was obviously returning, after an absence of at least two hours and a half, it appeared of interest to determine if the return could be checked and a normal state again produced by a second administration of nitrite. The dyspnœa being as yet but slight, it seemed sufficient to administer only half the original dose of nitrite of sodium.

At 6 8', therefore, five minims of the same 10 per cent. solution, or half

a grain, of nitrite of sodium were given to the patient in a drachm of water.

In less than a minute he exclaimed " its away."

At 6 9', it was found, on auscultating, that all accompaniments had vanished from both sides, the breathing having become perfectly soft. The time-relation of inspiration to expiration had also become altered, for at the right side it was 1 : 1, and at the left side 1 : ¾, showing a diminution in the duration of expiration.

The patient was finally seen at 7 15' A.M. He had continued quite well since he had received the second dose. There had been no wheezing, or sense of tightness, nor any form of difficulty in respiration. On auscultating over both lungs, it was found that the breath sounds were perfectly clear and soft, although a few small crepitations occurred early in expiration at the right side. The pulse was 78, and the respirations were 24 per minute. The time-relation of inspiration to expiration was at both sides 1 : 1½.

OBSERVATION VI.—While this patient was suffering from a severe attack of orthopnœa, an observation was made on him with nitroglycerine. The attack began at 2 A.M. on a damp and cold night (December 28, 1886). When he was seen at 2 35' A.M. he was sitting upright in bed, holding on to it, and breathing with extreme difficulty, the difficulty being, as he described it, during both inspiration and expiration. There was also a cough which, after great and prolonged efforts, brought up sputa, copious in amount, muco-purulent, stained with blood, and very tenacious. It was found, on auscultation, that loud and continuous sibili occurred in both lungs during inspiration and expiration.

At 2 41', he received two and a half minims of a one per cent. solution of nitroglycerine diluted with a drachm and a half of water.

Almost immediately thereafter he exclaimed, "Oh! it's easier," and the wheezing had almost disappeared in a few seconds subsequently.

At 2 42', inspiration and expiration were in both lungs very much softer, sibili had almost disappeared, slight subdued rhonchus was heard at the beginning of expiration, and there were some crepitations. The pulse was 96, and the respirations were 36 per minute.

At 2 45', at the right side, there was slight rhonchus throughout inspiration, and at the left side short rhonchus at the beginning of inspiration. The pulse was 78, and the respirations 24 per minute.

At 2 47', wheezing had again become audible, an attack of difficult coughing occurred, and the patient stated that the breathing was again tight, but in a few seconds afterwards he said that the tightness had disappeared. The pulse was 77, and the respirations 24 per minute.

At 2 54', the breath sounds were absolutely clear, soft, and vesicular, and without any accompaniment.

At 3 2', while the breath sounds at the right side were perfectly normal, at the left side, there were slight distant rhonchi at the beginning of inspiration and expiration. The patient experienced a little tightness of breathing, but only during a few seconds.

At 3 6', at both sides, there were distant sibili throughout inspiration and expiration.

At 3 10', another attack of violent coughing occurred, when a little sputum was expectorated. The pulse was 86, and the respiration 24 per minute.

At 3 12′, there was again marked wheezing, and rhonchi were heard during inspiration and expiration over both lungs.

The observations were contined until 5.35′, and they showed a gradually increasing development of breathlessness and of the respiratory accompaniments, but neither attained the severity and urgency which had characterized them before nitroglycerine had been administered.

OBSERVATION VII.—The effects of nitroglycerine were well illustrated in another patient, Thomas H., thirty-six years of age, a well-built, muscular man, a joiner by occupation, whose illness had begun about fourteen weeks before the observation was made.   There was no history of hereditary predisposition to asthma, and no personal history of pulmonary disease, with the exception of a single attack of acute pneumonia which had occurred four years previously.   The patient referred the origin of the asthma to a "severe cold," following exposure to a heavy rain.   A week afterward, the dyspnœa appeared, and paroxysms of asthma occurred regularly every morning at 6 o'clock, and lasted for about three hours.   He also had considerable dyspnœa during the greater part of nearly every day, and especially when the weather was foggy, which prevented him from working or going about, but produced no discomfort while he was at rest beyond a sense of tightness and weight in the chest.   He was free from cough and had no sputum, excepting when the dyspnœa was present, and at these times his sputum was pretty copious, watery, and frothy.   No evidence was obtained of enlargement of the heart; but, although the chest was well formed, the lungs were slightly emphysematous.   Expansion was good, expiration was a little prolonged, and, generally, rhonchi and sibili with medium and small crepitations were audible over the greater part of the chest.   The patient also suffered from headaches, which occurred in the morning after the commencement of each paroxysm, and usually disappeared toward the afternoon

The case was, therefore, one in which chronic bronchitis was also present, and on several occasions after the patient's admission into the hospital observations were made while there were no paroxysms of asthma on the influence of nitrites on the symptoms of bronchitis, to some of which I shall afterward refer.   The influence of nitrites and the conditions in which the patient was placed in the hospital, appeared to lessen the severity of the asthmatic paroxysms; they became less frequent, the time of their occurrence lost the regularity it had originally possessed, the bronchitis disappeared, and the patient was dismissed on December 26, 1886, apparently cured of both asthma and bronchitis, as he had had no symptoms of either disease for ten days.

After returning to his home in Edinburgh, he remained well until the 28th of December.   On that day, although he had not resumed work or undergone any exposure, severe dyspnœa appeared at 3 o'clock in the afternoon and continued until 9 o'clock on the following morning.   He, therefore, again came to the hospital, and was readmitted.   He remained free from dyspnœa during the afternoon, but toward evening the breathing gradually became difficult, until at about 11 30′ P.M. the difficulty had increased to orthopnœa, and the patient was obliged to sit upright in bed, supporting himself with his extended arms.

At 1 12′ A.M., the patient was in great distress, feeling, as he said, "like to choke."   He stated that the difficulty in breathing was felt chiefly during expiration.   He had spat a small quantity of slightly adhesive

sputum.   There was loud wheezing, and when the chest was auscultated, sibili were heard throughout inspiration and expiration at both sides, completely masking all other sounds.   The pulse was 112, and the respirations 30 per minute.   The time-relation of inspiration to expiration was 1 : 3.

At 1 20', he received five minims of a one per cent. solution of nitroglycerine mixed with two drachms of water.   There was a perfect "storm" of accompaniments when the nitroglycerine was given.   In less than thirty seconds he said, "I feel a little easier."

At 1 21' 30", the wheezing was less audible, and at the left side inspiration was almost clear, but there were rhonchi with expiration.

At 1 23', the breathing was almost clear at the right side, and there was a brief sibilus on expiration at the left side.   Patient said he "feels much easier."

At 1 23' 30", at the right side there were sibili during expiration, and at the left side sibili during inspiration.   The pulse was 114, and the respirations were 30 per minute.

At 1 26', headache came on.

At 1 27', he expectorated about half an ounce of frothy and slightly tenacious sputum.

At 1 28', at the right side both inspiration and expiration were vesicular and free from accompaniments, and at the left side inspiration was perfectly clear, but very slight rhonchus occurred with expiration.   The wheezing was scarcely audible, and the patient said he was "a great deal easier."

At 1 31', the pulse was 108 and the respirations were 30 per minute. The patient said the difficulty of expiration was "nothing to speak of."

At 1 34', the breathing was at times perfectly free from accompaniments, and then for a few seconds sibili or rhonchi were heard on one or other side of the chest.   The pulse was 108 and the respirations were 28 per minute.   The time-relation of inspiration to expiration was 1 : 2½.

At 1 38', the chest was beginning to feel tight, and the wheezing was distinctly audible.

At 1 42', the breathing had become "a great deal stiffer;" the difficulty, according to the patient, was in "getting out breath."   Over both lungs rhonchi and sibili were heard during inspiration and expiration.

At 1 50', the above sounds were only occasionally heard, and the patient said he "feels as free as ever he was," and his appearance was again that of ease.

At 2 2', 2 14', 2 27', and 2 44', the auscultatory phenomena continued as at last note.   At 2 14', the pulse was 106 and the respirations were 24 per minute; and at 2 27', they were 80 and 25 per minute, respectively.

At 2 58', the time-relation of inspiration to expiration was at the right side 1 : 1, and at the left side 1½ : 2½.   The character of the breathing was soft, but now and again a brief sibilus was heard, with small crepitations at the end of expiration.

At 3 15' and 3 57', the conditions remained as at the last note.   At the latter time the pulse was 80 and the respirations were 29 per minute; and the time-relation of inspiration to expiration was, at left side, 1 : 2.

The patient was now left to himself, apparently free from any obvious sign of dyspnœa, but still, on being asked, confessing to a sensation of slight constriction in the chest.

When he was again seen, at 4 30′ and 5 20′ A.M., he was sound asleep and breathing quietly and without wheezing.

OBSERVATION VIII.—The last case I shall describe is one which illustrates the close relationship frequently observed between bronchitis and asthma. The patient was a man, James B., fifty-two years of age, presenting the ordinary symptoms of pronounced emphysema and severe bronchitis, and suffering greatly from frequent periodic attacks of dyspnœa and orthopnœa. The bronchitis was manifested by coarse and medium crepitations, continuous rhonchi and sibilations, and severe cough, accompanied with an abundant muco-purulent and frothy sputum. The asthma manifested itself in paroxysms of urgent orthopnœa, occurring during the night and almost every night, and so prolonged that the patient could not obtain sleep, except in the morning and during the day.

On the 8th of January, 1885, one of the usual paroxysms began at 9 P.M. He was seen immediately afterward, when he was sitting up in bed in great distress, with loud wheezing respiration ; and it was found that rhonchi and sibili were abundantly present.

At 9 30′ P.M., a pulse tracing was taken, the pulse being 64 and the respirations 21 per minute. (Fig. 12.)

FIG. 12.

James B.   Before nitrite of sodium.   Pulse 64, respirations 21 per minute.

At 9 35′, five grains of nitrite of sodium dissolved in one drachm of water, were administered.

Almost immediately afterward the patient felt some peculiar sensations, which he described as "the medicine going all over him and making him feel queer." In the course of a few minutes the dyspnœa was relieved, the rhonchi and sibili had entirely disappeared, and the respiratory movements were more full and more easily performed. The patient soon lay down on the bed and seemed disposed to sleep.
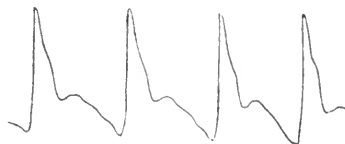
The pulse showed the following characters at thirty minutes, at one hour, and at one hour and a half after the nitrite had been administered. (Figs. 13, 14, and 15.)

FIG. 13.   FIG. 14.

James B.   Thirty minutes after nitrite of   James B.   One hour after nitrite of sodium.
sodium.   Pulse 76, respirations 20 per minute.   Pulse 76, respirations 18 per minute.

The chest was frequently auscultated, and it was found to remain free from rhonchi and sibili during two hours succeeding the administration. After this time rhonchi were again heard, but only in a subdued form. The patient, however, was so greatly relieved in his breathing that he

slept whenever he was left undisturbed, and he remained free from dys-
pnœa all night.

At two hours and at four hours after the administration, the pulse
possessed the characters represented in the next tracing.   (Fig. 16.)

FIG. 15.

FIG. 16.

James B.   One hour and a half after nitrite
of sodium.   Pulse 72, respirations 17 per
minute.

James B.   Four hours after nitrite of sodium.
Pulse 64, respirations 18 per minute.

On other occasions similar satisfactory results were obtained on this
patient with nitrite of sodium and also with nitroglycerine.   The
latter, however, several times produced severe headache, and, therefore,
nitrite of sodium was more frequently given.   While five-grain doses of
it in a most marked manner subdued the severe paroxysms of dyspnœa
—the patient on one occasion stating that he would have died had the
medicine not relieved him—it did not cause any headache.   At the same
time, it was found that the dyspnœa could, in this patient, generally be
relieved by one or two grain doses.   One administration, but only one
out of a considerable number, of five grains was followed by toxic symp-
toms, consisting mainly of great feebleness of the circulation, which,
however, quickly disappeared after the administration of a little brandy.

The administration by the stomach of nitrite of amyl, nitrite of ethyl,
nitrite of sodium, and nitroglycerine, therefore, produced the same kind
of effect on asthma as that which followed the administration by inhala-
tion of the volatile of these nitrites.   A marked, and for therapeutic
purposes a very important difference, was manifested in the duration of
these effects, which were greatly prolonged by stomach administration.

It has been well recognized that the auscultatory phenomena which
have been referred to, are present during the asthmatic paroxysm.   It
does not appear to have been distinctly appreciated that they are so
intimately associated with the paroxysms, that dyspnœa is present only
while they are present, and that it subsides or disappears only when
they subside or disappear.   Not only has this been rendered apparent
by the observations I have described, but also by an observation in
which the exceptional result was obtained, that a nitrite administered
during a severe asthmatic paroxysm, failed to produce more than an
insignificant and temporary improvement in the dyspnœa, and equally
failed to subdue more than to a slight extent, and for a brief period,
the loud rhonchi and sibili that were present.

The observations that have been described further show that both
the dyspnœa and the sounds in the chest can be made to disappear
simultaneously, or nearly so, by substances whose action is to reduce,

powerfully, the contractility of non-striped muscle. It appears to follow from this that the dyspnœa of asthma is caused by spasm of the bronchial muscles.

The view that this dyspnœa finds its chief explanation in spasm of the diaphragm, associated or not associated with spasm of the ordinary muscles of respiration has, as I have already stated, received so damaging a criticism from Biermer, that its further refutation by such observations as have been brought forward seems to be almost unnecessary. The remaining view to which any importance may be attached, that, namely, of constriction of the bronchial tubes by swellings of a hyperæmic, herpetic or urticaria-like character—whose most prominent upholders are Weber and Sir Andrew Clark—presupposes for the production of the swellings a dilated state of the bloodvessels of the bronchial tubes. The means which I have successfully employed, however, for controlling and checking the asthmatic paroxysm are the very means which should, according to this theory, be the most efficient that could have been selected for increasing the paroxysm and rendering it more prolonged. There is no fact in pharmacology more certain and undoubted than that nitrites produce rapid and great dilatation of the bloodvessels throughout the body.[1] In the first observation I brought forward, and I have others of a like kind, this dilatation was produced at the moment when the dyspnœa disappeared; it was maintained while the dyspnœa was absent; and it gave place to a normal condition of the bloodvessels when the dyspnœa returned. It seems, therefore, to have been abundantly shown that the theory of the production of asthmatic dyspnœa by swellings of the bronchial mucous membrane of a hyperæmic or inflammatory kind can no longer be maintained.

The conceptions of the conditions that immediately produce the asthmatic dyspnœa or orthopnœa, have been obscured by the numerous and unharmonizing theories that have been propounded. If the results of the observations I have brought forward should produce the impression upon others which they have produced upon me, I believe these obscurities will to a great extent disappear, and the old doctrine that the asthmatic paroxysm depends immediately upon spasm of the bronchial muscles, will be more firmly established in the position which it had formerly occupied. At the same time, it is not to be supposed that this doctrine is incompatible with the view that, in a secondary manner, and as a result probably of the dyspnœa which has already been caused by contractions of the bronchial muscles, spasmodic contractions may also be

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[1] Although it has not been proved by direct observation that nitrites dilate the bloodvessels on the surface of the bronchi, there is no reason to doubt that they do so ; while the facts that these bloodvessels are derived from the aorta and intercostal arteries, and that they possess the same structure as the other bloodvessels of the systemic circulation afford a strong presumption in favor of their being dilated by nitrites in common with the other bloodvessels of this system.

originated in the diaphragm and in other of the ordinary muscles of respiration.

The success in any disease of a therapeutic agent whose action is a known one affords valuable evidence of the correctness of the theory of the causation of that disease. Such evidence appears to be afforded in a very incisive manner by the influence of nitrites in asthma. In this disease many other remedies have also been found to produce benefit. Probably this benefit has been more markedly associated with the inhalation of the smoke of certain solanaceous plants, of nitre, and of several patent medicines in the form of powders, than with any other remedies. The cause of the benefit which these substances produce is, however, almost unknown, and such speculations have been advanced as those of Oertel in his *Treatise on Respiratory Therapeutics*,[1] that the fumes of stramonium and of nitre are beneficial because they stimulate the air passages, giving rise to violent coughing and copious expectoration, and not because they act anæsthetically and antispasmodically on the bronchioles and lungs. Their influence upon the essential phenomena of asthma, and especially upon those phenomena that imply spasm of the bronchial tubes, has not, indeed, been investigated, nor is there much knowledge as to the composition of the patent asthma remedies. The extensive use of these remedies suggests that advantage must be gained from their employment; and it is a common experience to meet with patients who have a greater faith in their power to give relief, than in the arsenic, or iodide of potassium, or lobelia which may be recommended to them by their medical advisers. So much have I been impressed with this circumstance, that I have procured several of these patent medicines for the purpose of having their composition, and the composition of the products of their combustion, determined. This has been done for me by my assistant Dr. Atkinson, with the results noted in the subjoined table.

Arsenic was searched for in all of the preparations, but was not discovered in any of them. Nitrites were not found in the smoke of any of the cigarettes examined; but of the other preparations, in 66 per cent. the products of combustion contained nitrites, and in large quantity in 50 per cent. of them.

While these results supply a sort of confirmation to the value of nitrites in asthma, which the observations that have been described so strongly suggest, it is undoubtedly the case that the best therapeutic effects are not obtained by the inhalation of nitrites, but by their administration through the stomach. The facts that have been stated seem to justify the assertion that their administration in this manner in asthmatic dyspnœa or orthopnœa is entitled to rank as one of the most valuable of the applications of pharmacology to the treatment of disease,

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[1] Von Ziemssen's Handbook of General Therapeutics, translated by J. Burney Yeo, M.D., 1885, vol. iii. p. 178.

an application at least as valuable as that in the painful angina of aortic disease, to which nitrites are at present almost restricted.

	BEFORE BURNING: INFUSION MADE WITH WATER CONTAINS			AFTER BURNING: SMOKE CONTAINS	
	Nitrite.	Nitrate.	Pupil dilator.	Nitrite.	Pupil dilator.
1. Maokill's Asthma Cure (Hamilton) . .	None	Distinctly	Distinctly	Distinctly	Distinctly
2. Himrod's Asthma Cure (Himrod Manufacturing Co.)	"	Abundantly	"	Abundantly	"
3. Hinksman (Carluke)	"	Distinctly	"	Distinctly	"
4. Senier's Asthma Remedy (London and Milwaukee.)	"	Trace	"	None	"
5. Green Mountain Asthma Cure . . .	"	"	"	"	"
6 Binning's Asthma Cure	"	Distinctly	"	Distinctly	"
7. Girdwood's Patent Asthma Cure (Belfast.)	"	"	"	"	"
8. Edward's "Valley Moss" Asthma Cure	"	Trace	"	None	"
9. Ozone Paper (Huggins, London). . .	"	Abundantly	None	Abundantly	None
10. Hockin's Remedy for Asthma and Bronchitis (Ryde, Isle of Wight)	"	None	Distinctly	None	Distinctly
11. Papier Fruneau contre l'Asthme (Fruneau, Nantes.)	"	Abundantly	None	Abundantly	None
12. Dr. Palmer's Antiasthmatic Papers (Simpson & Co., Dublin.)	"	"	"	"	"
13. Joyes' Cigares Antiasmatiques . . .	"	Trace	Distinctly	None	Distinctly
14. Argo Cigarettes (Blair, Perth). . . .	"	Faint trace	"	"	"
15. Cigarettes Indiennes (Grimault & Cie., Paris.)	"	None	Trace	"	Faint trace
16. Kay's Stramonium Cigarettes (Stockport)	"	"	Distinctly	"	Distinctly
17. Dr. Douglas's Maori Cigarettes (Perth)	"	Trace	"	"	"
18. Marshall's Cubeb Cigarettes (Horner, New York.)	"	None	Trace	"	Faint trace

NEURALGIC HEADACHES WITH APPARITIONS OF UNUSUAL CHARACTER.

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THE peculiar cases of migraine I am about to describe must be excessively rare in either of their varieties, since, with the largest opportunities, I have seen in all but four examples. These are so interesting that they possess a value which sets them quite above the position of mere rarities; perhaps their relation may call forth from others the statement of like cases. In the cases I shall describe, the ordinary subjective images of zigzag lines or rotating wheels were replaced by more definite shapes, so as sometimes to induce the belief for a time, on the part of the patient, that a ghost has been seen. In two persons the vision came as the only visual prodrome of severe headaches. In

another the appearances were various; at times followed the common zigzags, and at others occurred in the intervals between a succession of exasperating headaches. I describe first the lighter cases.

Case I.—Miss W., æt. thirty, was in good general health and able to bear great fatigue, and to use her mind and body incessantly as a teacher. About once a week for many years she had attacks of migraine of great severity. When nineteen years old she began, just before the headaches, to see a bright gold-tinted cloud, and with it an appearance of parti-colored rain. There was most clouding of vision when the sequent pain was over the right eye, and these visual phenomena were not constant. Somewhat later she had for months permanent headache on the vertex only, and now and then the addition of ophthalmic migraine.

When twenty-eight years old, and still subject to prolonged headache, the attacks changed their type. After a few weeks of freedom, one day, when going up stairs, she was abruptly aware of being accompanied on her left by a large black and very hairy dog. In some alarm she ran into a room and sat down, but still found the dog beside her. Being a woman of courage, she put out her hand to touch it, but could feel nothing, although her ghostly companion was still perfectly visible. At this moment a severe pain began over the left eye, and the dog was gone.

These attacks recurred at intervals, as well as the now ordinary brow pain without the dog vision, but the dog headaches, as she called them, were always the most severe. The visual symptoms left her after some years, but as she went abroad to live, I lost sight of her altogether for a time. I have since heard that in middle life her headaches left her altogether. I should add as a curious detail that nearly always, but not inevitably, the dog appeared as she was going up stairs.

Case II. is very interesting. Mrs. C., of Arkansas, æt. thirty-eight, mother of four children, consulted me on account of a condition of great prostration which had lasted for years, and was due to exhausting lactation subsequent to excessive hemorrhage at the birth of her last child. She had been a strong and vigorous woman, and with extreme weakness and great anæmia had no organic malady. She had been unusually free from headaches. In the fourth month of her lactation she was dressing in front of a mirror, when she was suddenly aware, as she turned to the left, of the presence beside her, in full daylight, of her sister who had been dead for several years. In great terror she turned to see her, and found that, as she did so, the figure moved, keeping the same relation to her as when first observed. She staggered to the bed and fell upon it. When presently she opened her eyes the figure was gone, and she was at once conscious of a violent pain over the left eye, a pain which lasted for many hours, and wound up with an attack of nausea and a great flow of pale urine.

For some time she was supposed to have had sight of a ghostly visitant. A month later, in her drawing-room with people about her, she again saw the same spectral form, and once more had a headache. Until this sequence occurred several times, she laid the headache to the ghost, and not the ghost to the headache, as she learned to do after the phenomena had been many times repeated. When I saw her she still had migraine, but usually on the right side, and without the spectre, but the rarer left-sided headaches were always preceded by an apparition

of her sister dressed for the street in a bonnet. She thinks that with closed eyes the vision becomes less distinct, but to cover the right eye only makes no difference.

CASE III.—Miss J., æt. thirty-eight, of New Hampshire, was one of a family doomed to a variety of grave neuroses. Two brothers died of epilepsy, and two sisters had been insane. Neuralgic headaches were inherited by all of them. At the age of thirty she became hysterical, and for three years suffered with losses of power, spasms, and hemi-analgesia. The accustomed headaches went on as usual, but with the addition of one horrible symptom, which was never constant, and, in fact, was rare unless the headache came at her menstrual period. Usually the type was congestive. A slight blur of vision was followed by a neuro-paralytic state of the temporal arteries, flushed face, and within a half hour violent pain over and under one eye, and later in all parts of the head. A rare form of pain preceded the monthly flow, and was ushered in by a ruddy, indistinct spot, like mist, through which, as it grew, she still saw the dim outlines of objects. The attacks were on either side, and the visual phenomena alike. A few months later the red blur took suddenly the form of a near relative, who appeared to her covered with blood, and wearing an expression of profound melancholy. The headache followed the spectral apparition within a few moments, and as it increased with acute pain over either eye the figure faded, but left her for some days with an agonizing desire to kill the person whose image she had seen. As she was profoundly attached to this relative, the conflict between her morbid impulse, which was at times almost uncontrollable and her very distinct sense of the sin of yielding, became most painful to witness. As time went on the apparition became more frequent, and was seen at intervals during the entire period of menstrual flow. Meanwhile her mind grew weaker, and a profound melancholia affected her for two weeks after menstruation, to recur with brow pain and spectral illusion at the next period. At last, after all manner of treatment had been used in vain, both ovaries were removed, with the best possible results. The headaches, hysteria, and spectral appearances left her by degrees. At first, for some months, they occurred in milder and yet milder forms once a month, and at last disappeared. The melancholy lessened, and after a year ceased to exist, and left her in a condition of absolutely perfect health of mind and body.

The last case I have to state is, of all, the most valuable, and of it I have the fullest account.

CASE IV.—E. C., male, æt. thirty, of New Jersey, weight 168, not anæmic. Has never had syphilis. The urine is normal, but pale and in excess after an attack. All the organs are healthy, or at least seem to be free from organic disease.

He is a man of active intelligence and has for many years been subject to the incessant strain of a business which clearly overtasks his strength—nevertheless, he sleeps well as a rule. His memory is good and his mind clear for brief work, but he has become increasingly irritable. He is of late years rarely free from pain in some part of the head, but has hemicrania which occurs at intervals of weeks or as far apart as three months, and has existed with ophthalmic symptoms since youth save for a period of fifteen years, its return being consequent to typhoid fever in 1865.

Anger, worry, prolonged use of the eyes in near work are the parents of attacks, or of what we may call the cephalalgic status which lasts two or three weeks and gives rise to one or more acute headaches daily.

The symptoms of onset are these, frontal and occipital sense of tension lessening toward night, good sleep follows, next day he awakens with some pain between the eyes and slight photophobia.   The second night, or the morning after it, he is aware of being flushed, but has no cerebral throbbing.   In a few moments the lids feel as if pulled toward the inner canthus and fortification zigzags appear, with next partial blurring of vision which seems in twenty minutes to efface the lines and include more or less of the field.   The lines seem to be projected one inch from the eye, and flash, and come and go with shimmering prismatic colors. The dimming of vision lasts some twenty minutes and leaves him with slight vertigo and a feeling of fulness of the head, but pain always begins over the eye which has distinct vision, and of this he is sure.   It increases as the eyesight clears, and is about one inch above the eye. Exertion, stooping, anxiety increase it.   The pain lasts from one to three hours and ceases without nausea.   When it occurs over the left eye he has sometimes slight aphasia for five minutes, and in youth this was more severe and more lasting.

As the zigzags fade he has exalted sense of hearing; loud voices hurt him for a half hour, and this is the period of vertigo.   At one time he had at this period of the attack tingling in the fingers of the side opposite to that of the pain.   After a number of these headaches he is subject to the curious and exceptional illusions which have caused me to report his case.   At times these replace the zigzag lines, but later in a series of headaches they come on independent of the hemicrania and occur at night, while awake or in full daylight.

1. A common delusion with him is to see about twenty feet distant a trellis of silver covered with vines and flowers of brilliant tints.   This is seen best when the eyes are open, and comes and goes.

2. He sees a series of complex geometrical figures at the centre of the field.   These are brilliant pink or red.

3. Quite commonly he sees multiple red circles intertwined and in rapid rotation, and once a red eye which seemed to approach him from a distance.   Sometimes there is a milky cascade before both eyes.

4. He saw once a crescent of silver on the wall and suspended from it numerous heads in profile.   Some were strange to him and some were vivid revivals of faces which he had long forgotten.

5. Six years ago, he saw, during an attack, a huge red spider, which melted into a series of red rectangles revolving in swift motion.

6. He has several times and first on awaking seen the door open and a procession of white-robed veiled figures enter.   They did not fade until he arose and lit the gas.   These were seen with his eyes open or shut, and he could not double them by causing himself to squint by pressure on one eye.

At one time for two years he had frequent vertigo without loss of distinctness of hearing.   It was apparently of lithæmic origin, and was relieved by careful correction of diet.   Of late he has some acidity of stomach after an attack, and is often able to cut off a second headache by a saline cathartic.   As the near use of his eyes seemed to be the main cause of trouble, and to be competent to bring about the series of congestive conditions which evolved the phenomena I have described,

I asked Dr. William Thomson to reëxamine his eyes. Briefly, he had no insufficiency, but there was in the right eye hypermetropic astigmatism of three-quarters of a dioptric axis at 75°, and in the left myopia of one dioptric and hypermetropic astigmatism of 2.5 dioptric axis at 100°. There was no marked gain from any treatment, and I have not seen the case for some time.

Our present state of knowledge, or want of knowledge, makes comment difficult as regards these cases. Why should the zigzag lines or the catherine wheel be so common, and how shall we explain why in rare cases the storehouse of memory sets free for visual projection strange figures long unremembered? The phenomena are not uncommon in disease, but their association as part of the complex symptom, hemicrania, is undescribed. The connection of epilepsy and prodromic visions I have often seen. Finally, one is tempted to ask if some ghost stories may not arise out of these rare examples of headaches preceded by hallucinations.

ATROPHY OF THE GASTRIC TUBULES:
ITS RELATIONS TO PERNICIOUS ANÆMIA.

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As early as 1860 Dr. Austin Flint[1] suggested the probable dependence of the group of cases known as pernicious anæmia upon degenerative disease of the gastric tubules, and ventured to predict that eventually this opinion would be corroborated. Investigations of morbid changes in the mucous membrane of the stomach had previously been reported in England by Drs. Hanfield Jones,[2] Wilson Fox,[3] and Habershon,[4] and in Germany particularly by Dr. F. Schäpfer.[5] They did not consider, however, the marked and different changes found with reference to the anatomical characteristics of any particular disease or diseases.

In 1865 a memoir by Dr. Samuel Fenwick[6] was published on the "Morbid Changes in the Stomach and Intestinal Villi present in Persons who have died of Cancer." The histological changes found by him in

[1] Degenerative Disease of the Glandular Tubuli of the Stomach, American Medical Times, September 15, 1860.

[2] Observations of Morbid Changes in the Mucous Membranes of the Stomach, Medico-Chirurgical Transactions, vol. xxxvii., 1854.

[3] Contributions to the Pathology of the Glandular Structures of the Stomach, Medico-Chirurgical Transactions, vol. lxi., 1858.

[4] Cases Illustrating the Pathology of the Stomach, Guy's Hospital Reports, Series III., vol. i., 1853–1855.

[5] Virchow's Archiv, vol. vii.   [6] Medico-Chirurgical Transactions, vol. xlviii.

many of his cases were very similar to those described by the previously mentioned observers, viz., disappearance of the cells in the gastric tubules, granulo-fatty degeneration and atrophy, and an increased formation of connective tissue. He also noted a marked thinning of the mucous membrane and decrease of its weight. The above changes were more marked in those patients who had suffered from cancer of the breast. He suggested that these alterations in the secretory structures of the stomach offered a possible explanation of the anæmia which accompanies malignant disease.

In 1877 four cases of pernicious anæmia were reported by Dr. Fenwick[1] (including one previously reported by Dr. Hanfield Jones), in which marked and very general atrophy of the gastric tubules was found. The only other cases presenting the clinical picture of progressive pernicious anæmia and associated with atrophy of the gastric mucous membrane, which I have been able to find recorded, are two by Nolen,[2] one by Quincke,[3] one by Brabazon,[4] one by Henry and Osler.[5] Nothnagel has reported a case of cirrhosis of the stomach with the clinical symptoms of pernicious anæmia.[6] In some of these cases the histological investigations lack desirable completeness. During the past two years three cases of pernicious anæmia have come under the author's observation in the wards of St. Luke's Hospital. The patients were carefully observed over very considerable periods of time, and in two of the cases autopsies were obtained.

The histories well illustrate the group of symptoms which have come to be regarded as pathognomonic of pernicious anæmia, and the histological investigations would seem to confirm the opinion which has been expressed by several observers, that "a primary degeneration and atrophy of the gastric tubules occurs," and that extensive destruction of the secretory structures of the stomach may be regarded as causal in a certain number of cases of pernicious anæmia.

CASE I.—J. T., male, aged forty-six, carpenter. Admitted to St. Luke's Hospital April 9, 1886. Family history negative. The patient stated that he had been a moderate drinker; denied venereal disease. For the past five or six years his appetite had been poor, and he had suffered from constipation. He had been troubled with vomiting "off and on" during this period, and thought that he had gradually lost flesh. For the last two years he had had much headache, and occasional attacks of loss or marked dimness of eyesight. Six months ago he began to be troubled with breathlessness on slight exertion, his feet became swollen, and he was obliged to give up work. The dyspnœa persisted, but the œdema gradually disappeared, and he was able temporarily to

[1] Fenwick: London Lancet, 1877, vol. ii.

[2] Centralblatt f. d. mediciuische Wissenschaften, Bd. xx.

[3] Quincke: Volkmann's Samml. klin. Vortrage, No. 100 (Case b).

[4] Brabazon : British Medical Journal, 1878, July 27 (without microscopical examination).

[5] Henry and Osler : American Journal of the Medical Sciences, April, 1886.

[6] Nothnagel : Deutsches Arch. f. kl. Med., Bd. 24, p. 353.

return to work.   For the past month he has again been worse; he has been very weak and confined to his bed the greater portion of the time.

On admission to the hospital the patient was very weak, and suffered from breathlessness and palpitation on the slightest exertion.   There was extreme pallor of the skin of the trunk and extremities, with the peculiar lemon-tint of the skin of the face which obtains very constantly in pernicious anæmia.   The ocular conjunctiva was of the latter hue, the palpebral conjunctiva milky white, apparently bloodless, as were the other visible mucous membranes.   There was slight œdema about the ankles and puffiness about the eyes, and slight œdema of the skin of the entire body. The heart's apex was in the fifth space, within the mammillary line; a soft systolic murmur was heard over the mitral area, and a similar one over the pulmonary area.   There was no evidence of pulmonary disease, and the areas of hepatic and splenic dulness were apparently normal. There was a slightly enlarged gland at the angle of the jaw on each side, sensitive on pressure.   The superficial glands elsewhere were not enlarged. There was an absence of external evidence of syphilis.   The patient was emaciated; the abdominal walls, however, contained a fair amount of fat. The pulse was 84, and was soft and compressible; there was no appreciable thickening of the walls of the superficial arteries.   The temperature (in mouth) was 99.2°.   The urine was free from albumen, sugar, and bile pigment.   Specific gravity 1.020.   Microscopic examination negative. Examination of the blood, April 17th: Number of red globules per cubic millimetre 2,225,000 (5,000.000 normal), hæmic unit therefore 44.5. Proportion of white to red globules 1 : 130.   Percentage of hæmoglobin (estimated by Gower's hæmoglobinometer) 35.   The red blood globules were round, oval, and pear-shaped, and many were much larger than normal.   Microcytes were present in considerable number; only an occasional Schultze's granule mass was seen.   The patient had two rather profuse hemorrhages from the bowels on the day of admission.   Arsenic, iron, and daily inhalations of oxygen, with a milk diet, were ordered.

April 28th. The patient's condition is very much the same as on admission.   Examination of the blood: Number of red blood globules per cubic millimetre 2.451.000, hæmic unit 49.   Proportion of white to red 1 : 123.   Percentage of hæmoglobin 40.

May 21st. Has steadily grown worse.   The enlargement of the glands at the angle of the jaw has disappeared.   There is distressing palpitation and dyspnœa on slight exertion.   The cardiac murmurs have increased in intensity, and a loud systolic murmur is heard over the vessels of the neck.   The first sound of the heart is markedly feeble, pulse 102.   Temperature normal.   The daily average excretion of urine is 56 ounces.   (The patient takes nearly two quarts of milk daily.) Occasionally a trace of albumen is present, but no casts have been found at any time.   The daily average excretion of urea is about seven grains to the ounce.   Examination of blood: Number of red globules per cubic millimetre 1,067,000, hæmic unit 21.3.   Proportion of white to red, 1 : 107.   Ophthalmoscopic examination by Dr. Edward Loring: The fundus of the left eye is hazy and indistinct, the nerve is very pale, the capillary circulation is almost nil; it has the whiteness of atrophy, but appears more woolly.   The arteries are reduced in size, and are almost white, with broad white reflex.   The veins are increased in size, and are tortuous, carrying their size far into the retina and tapering at the disk.   The arteries and veins are of nearly the same color on the

disk; the veins are much darker in the retina. There is no pulsation in either veins or arteries. There is pulsation in both veins and arteries on pressure. There is no general retinitis or neuro-retinitis. There is an absence of white plaques. There is no swelling of the disk. The fundus of the eye presents the same appearance of pallor as the face. The right eye is the same as the left.

June 19. The patient's condition is worse. There is gradually increasing œdema of the lower extremities and of the face. Pulse 124 and exceedingly weak; temperature, $100\frac{3}{5}°$. Complains of a " woolly " feeling in the ears and of dimness of eyesight. Examination of blood: number of red blood globules per cubic millimetre 948,881, haemic unit 18.9. Proportion of white to red 1 : 124. Percentage of hæmoglobin 11.5 (the extremely pale tint of the blood may have vitiated the correctness of the color test). The arsenic, the dose of which had been gradually increased, and the iron were discontinued, and caffeine, digitalis, and whiskey (three ounces daily) were ordered.

27th. There has been marked improvement in the patient's condition since the last note. The œdema has, to a great extent, disappeared, the pulse is markedly stronger and 96, temperature normal. The patient expresses himself as feeling "a hundred per cent. better." Examination of the blood: number of red globules per cubic millimetre 1,133,750; hæmic unit 22.6. Proportion of white to red, 1 : 203. Percentage of hæmoglobin 20. Microscopic examination shows similar forms of globules to those previously noted.

July 7. The improvement has been maintained. The patient is again taking arsenic and to-day enemata of defibrinated beef blood, eight ounces daily, are ordered in addition. Examination of blood: number of red blood globules per cubic millimetre 2,163,400; hæmic unit, 43.2. Proportion of white to red, 311 red counted, no white seen. Percentage of hæmoglobin 39.

22d. Has still further improved. Is able to be up and about and has been absent from hospital on leave on several occasions. The mucous membranes are not as absolutely bloodless as has been the case hitherto. Temperature 99.2°. There has been no increase in the patient's weight. The daily percentage of excretion of urea has slightly increased since the administration of the beef blood; the amount of urine voided has maintained its former average. Examination of blood: number of red globules per cubic millimetre 2,072,525; hæmic unit, 41.4; percentage of hæmoglobin 40. The majority of the red globules are certainly larger than normal and many are pear-shaped and oval.

August 8. The patient is again worse. There is again great weakness and much œdema. Temperature 103°. Examination of blood: red globules per cubic millimetre 1,161,400; hæmic unit 23.2; proportion of white to red 1 : 288; percentage of hæmoglobin 26.

September 4. There is little or no change in the patient's condition. Temperature normal. Examination of blood: number of red globules per cubic millimetre 1,328,450; hæmic unit 26.5; proportion of white to red, 254 red counted, no white seen; percentage of hæmoglobin 33.

18th. The patient's condition remains the same. Temperature 99.3°. Examination of blood: number of red globules per cubic millimetre 1,351,687; hæmic unit 27; proportion of white to red, 320 red counted, no white seen; percentage of hæmoglobin 30. On this date the patient

was discharged from hospital with the understanding that he should still remain under observation.

He was seen from time to time during the succeeding three months. He was able during the greater portion of this period to be up and to walk moderate distances without much distress. During the early part of December he began to be troubled with diarrhœa, the œdema again became troublesome, he rapidly grew weaker, there was much dyspnœa and palpitation, and on December 21st, he was readmitted to the hospital.

On this date the results of physical examination were much the same as on the patient's first admission to the hospital except that the emaciation was greater. The murmurs heard over the cardiac area and over the vessels of the neck were more intense in character, there was moderate œdema of the lower extremities and of the whole integument. The patient was very weak, pulse 90, temperature normal. The urine was free from albumen, sugar, and bile pigment, specific gravity 1.011, acid.

Ophthalmoscopic examination by Dr. Loring. The blood in the arteries is very light colored, and on the disk of a milky appearance. The reflex on the veins is broad and of a white color, as if the walls of the vessels were affected. There are some small decolorized hemorrhages or exudations. There is a marked arterial pulse on pressure. The upper artery becomes blanched on pressure. The vessels in the retina have a waxy appearance, possibly due to changes in their walls. Examination of blood : number of red globules per cubic millimetre 930,000 ; hæmic unit 18.6 ; proportion of white to red 1 : 107 ; percentage of hæmoglobin 10.

From this date the patient gradually failed, effusion gradually occurred in the pleural cavities, there was vomiting from time to time of matter of the color of chocolate, and death finally occurred on January 19th. Four days previous to death a distinct icteroid tint of the conjunctivæ and skin was developed. The daily average excretion of urea was almost indentical with that noted on the patient's previous stay in hospital. Throughout the whole period of observation there was marked anorexia, but little epigastric distress or vomiting after the ingestion of food, until the last days of life. Milk constituted the principal article of diet.

It was ascertained from the patient's friends, after his death, that he had been a hard drinker for many years.

The autopsies and histological investigations in both cases were made by Dr. Frank Ferguson, the pathologist of the hospital, and to him the author is greatly indebted for the time and labor given to the task.

Autopsy twenty-eight hours after death. The body was extremely emaciated, and its surface very anæmic, and slightly jaundiced. There was no œdema. Rigor mortis was present. The muscular tissue of the abdominal wall was anæmic and flabby. The peritoneum was pale, but otherwise normal.

Pleural cavities. There were twenty-four ounces of straw-colored serum in each, and there were old adhesions at each apex.

Heart. There were eight ounces of straw-colored serum in the pericardium. The heart was slightly increased in size. Its muscular tissue was flabby and anæmic. The heart muscle contained a great deal of fat. The ventricles were dilated ; the auricles were also dilated, but to a less degree ;

all the cavities contained partially decolorized clots. The valves were normal. The coronary arteries were normal.

Lungs were intensely œdematous. The fluid oozing from the cut surface was stained with bile. They were otherwise normal.

Spleen was normal in size and firm in consistency, but very anæmic.

Kidneys were normal in size, and firm in consistency. The capsules were not adherent, the surfaces were smooth, the markings were not distinct. They were anæmic.

Suprarenal capsules were normal in size; the cortex of each contained a great deal of fat. The medullary portion appeared normal.

Stomach was moderately distended with gas, and it contained a small amount of dark-colored fluid. It was normal in size, and the calibre of the pylorus was normal. The wall of the stomach, where it was in contact with its fluid contents, appeared thinner than normal. The veins beneath the mucous membrane were unusually prominent. The mucous membrane in the neighborhood of the pylorus was slightly thicker than at the fundus. The surface of the mucous membrane was smooth, and the stomach wall throughout was very anæmic. The œsophagus was normal.

Pancreas was anæmic. It was normal in size; it was slightly stained with bile.

Intestine. The mucous membrane of the small intestine was covered with mucus. It was anæmic and pigmented. The large intestine was filled with soft feces of a metallic lustre.

Thoracic duct was normal.

Liver was small, weighing two and three-quarters pounds. It was generally stained with bile. There was much fat arranged around the periphery of the lobules. It was very anæmic. The gall-bladder contained mucus. Its duct was impacted with a black calculus, one inch in diameter. There were other smaller calculi in the common duct, but its muscular wall and mucous membrane appeared normal. The orifice of the common duct was pervious.

Head and brain. The calvaria were normal. The brain was intensely anæmic. There was slight atrophy of the convolutions over the vertex of both hemispheres. The Pineal gland was very small. There was an absence of the soft commissure.

Sympathetic system. The semilunar ganglia were normal in appearance.

Marrow. There was no difference in the color and consistency of the marrow of the long and short bones. In both locations it closely resembled the normal marrow of the short bones. There was no fat in the marrow of the long bones.

HISTOLOGICAL EXAMINATION.—*Heart.* Small portions of the muscular wall of the auricles were teased, and considerable fat in small globules was seen in the cardiac cells. The auricles showed an equal degree of fatty degeneration. In fresh sections of the wall of the left ventricle, whole areas of the cardiac muscle were seen in the condition of fatty degeneration. Everywhere the transverse striæ were absent, and the cardiac cells were granular, and many of these appeared like small tubes filled with fat granules. There was an equal degree of fatty degeneration in the walls of both ventricles, and it was more marked than in the auricles.

Kidneys. There was a great deal of fat in the convoluted tubes of the kidney. The epithelium was everywhere swollen, granular, and fatty. The fatty degeneration was especially well marked in the cortex. There

was no increase in the fibrous tissue, but numerous small, round cells, of inflammatory origin were seen in the stroma of the organs.

Adrenales. There was much fat in circumscribed areas in the cortex of each suprarenal capsule.   In some places the proper cortex of the capsules was completely replaced by fat.

Pancreas. There was a slight increase in the fibrous tissue of the pancreas.   There was considerable fat arranged as follows: 1. A very considerable quantity between the acini, in the planes of the fibrous tissue. 2. There were large globules of fat seen by the unaided eye within the acini.   This fat in the recent state was of brownish color, and the globules showed many lines of constriction, as in the process of division and subdivision.   3. The cells of the gland contained very fine granules of fat. The cells were swollen.

Liver. There was a great deal of fat in the liver.   The fat was more abundant at the periphery of the lobules, but everywhere the hepatic cells contained a large number of fat granules.   There was brown pigment in the cells in the centres of the acini.   There was bile pigment in all the lobules.   The large bile-ducts, which were easily distinguished under the microscope, were normal.

Ganglia of the sympathetic. The ganglion cells were deeply pigmented; in other respects the cells were normal.   There was no change noticed in the nerve fibres or fibrous tissue.

Stomach. The walls of the stomach, including all its coats, appeared so natural that no effort was made to measure their thickness in the fresh state.   Any measurements of either the mucous membrane or muscular wall of the organ, after stretching on cork and hardening in alcohol, can only be regarded as useless, since the thickness materially depends on the degree of tension to which the organ is submitted in thus preparing it for microscopical examination.   Numerous sections were made of the stomach wall in the neighborhood of the pylorus; at the distance of two, four, six, and ten centimetres above the pylorus, along the greater and lesser curvatures; of the anterior and posterior walls, in the midzone of the stomach; of the different parts of the fundus not in contact with the fluid, and in the neighborhood of the œsophagus, and the following conditions of the mucous membrane were found in all the sections examined. In extensive areas of the mucosa not a trace of the gastric tubules could be seen.   In places, however, the most superficial parts of the gastric tubes, lined with cylindrical epithelium, could be distinguished.   The deeper portions of the tubules could nowhere be made out.   In the recent state the cells lining these remnants of tubules were granular and fatty. There was a large amount of fat in the stroma of the mucous membrane in very fine granules.   There was considerable hyaline material, resembling the hyaline casts of the renal tubes.   This material was seen in places in droplets, in places having, apparently, the shape of the tubes.   Osmic acid did not stain it readily, and ether did not dissolve it.   It was slowly stained by Bismarck-brown and the aniline colors.   It was dissolved by the prolonged action of ninety-five per cent. alcohol.   Numerous cells were seen near the surface of the mucosa, which were irregular in shape, and of the same size as the cells which lined the deeper portions of the gastric tubules.   Some of these had undergone hyaline degeneration.   Throughout the mucosa everywhere were large numbers of small triangular bodies, slightly larger than pus cells, without nuclei.   These were isolated in places, but were more frequently found in groups.   They behaved to re-

agents much the same as the hyaline material already noticed.   The fibrous tissue of the mucosa was not increased.

In addition to the elements already noticed, the mucous membrane was everywhere infiltrated with the small round cells so common in inflammatory processes.

The only difference noticed between the sections from the various regions of the stomach was that the remnants of a greater number of tubes were seen in the pyloric zone ; but nowhere were the secreting structures proper to the stomach noticed.   The muscularis mucosæ appeared normal.   There was a very moderate amount of fat in the submucosa. The submucosa otherwise appeared normal.   The muscular wall of the stomach appeared normal.   The vessels were normal.

Intestines.   Sections of the duodenum, jejunum, ileum, and colon were examined, and no special change was noticed.

Marrow.   There was no fat in the marrow of the short bones.   There were seen in it all the other elements normally found in this location, and also numerous small cells without nuclei, spheroidal in shape, and paler than red corpuscles.   Nucleated red corpuscles were not present.   A few of the Charcot-Neumann crystals were present.   The bone framework supporting the marrow was normal.   The marrow of the long bones contained no fat.   Small, round, colored corpuscles, similar to those found in the marrow of the short bones, were noticed.   Also several Charcot-Neumann crystals.

The tissues of the *eye* were carefully examined, and Dr. Loring has kindly sent the following report :

Beyond a certain dimness of the nervous elements, they appeared normal.   There was no increase of the connective tissue either in the nerve or retina.   The vessels were normal, arteries as well as veins showing neither thickening nor degeneration of their walls.   They contained, however, very little, if any, blood.   No red blood-cells were seen in either the retina, the choroid, or ciliary vessels around the nerve. The choroid and sclera appeared normal.

RÉSUMÉ.—*Clinical.*   A history of a possibly excessive use of alcohol for many years, of anorexia and gastric disturbance for five or six years, of marked anæmia, and failing health and strength, and of emaciation during the six months previous to the patient's admission to the hospital.   The occasional occurrence of hemorrhages, the presence of an irregular temperature curve, gradually increasing emaciation and prostration, with brief periods of improvement while the patient was under observation.   Red blood-globules finally reduced to 930,000 per cubic millimetre, the relative percentage of hæmoglobin remaining normal.   Megalocytes and poikilocytes in the blood in large numbers, microcytes in considerable number.   Death by asthenia, nine months after admission to the hospital.

Anatomical.   Extreme emaciation and anæmia, fatty changes in all the viscera, an absence of fat in the marrow of the long bones, almost complete destruction of the gastric tubules.

CASE II.—C. M., aged thirty-seven, salesman, was admitted to St. Luke's Hospital July 14, 1886.   The patient's family history was nega-

tive. With the exception of an attack of acute articular rheumatism in 1874 and two attacks of gonorrhœa, the last one in 1883, the patient stated that he had enjoyed excellent health until about eight months ago. He denied venereal disease, other than that mentioned above. Periodically, he had used alcohol in great excess. His weight, in December, 1885, was 190 pounds. Four months ago, he began to lose flesh and his appetite and strength became impaired. At this time he was in the habit of taking alcohol, in one form or another, before break-fast. The anorexia increased, until two months later he was unable to take any solid food ; forced attempts were followed by vomiting. Grad-ually great breathlessness and palpitation on slight exertion were developed.

On admission to the hospital, the patient was much emaciated and weak. His weight was 131 pounds. There were marked dyspnœa and palpitation on slight exertion. The skin was extremely pallid as were the visible mucous membranes. The heart's apex was in the fifth space, within the mammillary line ; there was an absence of murmurs. There was no evidence of pulmonary disease. The areas of hepatic and splenic dulness were apparently normal. There was slight enlargement of the in-guinal and post-cervical glands. There was moderate sensitiveness on pressure over the epigastric region. The pulse was 90, short and com-pressible. There was no evident thickening of the walls of the superficial arteries. There were no cicatrices on the glans penis or in the groins. The urine was free from albumen, sugar, and bile pigment—specific gravity 1.022.

An examination of the blood was not made until August 14th. On this date the number of red blood-globules per cubic millimetre was 1,862,325, hæmic unit, therefore, 35.2 ; proportion of white to red globules, 233 red counted, no white seen ; percentage of hæmoglobin 30. The red globules were round, oval, and pear shaped. Microcytes were present in considerable numbers.

August 16. The area of splenic dulness reaches, anteriorly, the anterior axillary line, indicating apparently an increase in size of the spleen since admission. The enlargement of the inguinal and post-cervical glands remains unchanged.

24th. Examination of the blood : Number of red blood-globules per cubic millimetre 1,461,825, hæmic unit 29.2, proportion of white to red, 329 red counted, no white seen.

Poikilocytes are very numerous, megalocytes and microcytes are present in considerable numbers.

September 14. The patient's condition has steadily grown worse since admission. The temperature is normal. Examination of blood : Num-ber of red globules per cubic millimetre 1,020,950, hæmic unit 20.4 ; proportion of white to red not increased. Percentage of hæmoglobin 25.

28th. Ophthalmoscopic examination by Dr. Loring. The capillary circulation of the disk is very much reduced. The color of the blood in the veins is very much lighter than normal, corresponding in appear-ance to arterial blood in the normal eye. The blood in the arteries is lighter than normal. The disk looks atrophic. There are hemorrhages in the upper ascending vein and below the region of the macula, also capillary hemorrhages near some of the veins, and here and there in spots in the upper and outer quadrant of the field. The external borders of both veins and arteries are not clearly marked, the edge

being ragged. There is little or no œdema anywhere, and there is an absence of swelling of the retina.

In spite of every therapeutic measure, the patient continued to fail. No new symptoms were developed, those present on admission simply increased in intensity. There was complete anorexia and the emaciation gradually increased. Physical examination continued to give the same nearly negative results, with the exception of the increase in the size of the spleen previously noted. The temperature was above normal during a portion of the month of August, the curve being very irregular; during the other periods of the patient's illness, there was apyrexia. The average daily excretion of urine was thirty-six and one-half ounces, the average daily excretion of urea was normal. Owing to unavoidable circumstances, the blood was not examined during the month previous to the patient's death, which occurred on October 20th from asthenia. Judging from the extreme pallor of the skin and mucous membranes, from the increased dyspnœa, palpitation, and prostration, the corpuscular poverty of the blood must have still further increased.

Autopsy Seventeen Hours after Death.—The surface of the body was intensely anæmic. Rigor mortis was present. There was no œdema. The surface of the penis showed no cicatrices.

Head. The scalp and calvaria were very anæmic. The brain throughout was normal in consistency, but intensely anæmic. The convolutions were pale and markedly atrophic. There was a great deal of serum in the meshes of the pia mater covering the entire vertex. The vessels at the base of the brain were normal.

There was a very small amount of fat of very pale color beneath the skin, and the muscular tissue in the abdominal wall was of a pale red color. The position of the organs in the abdominal cavity was normal. The peritoneum was anæmic.

Pleural cavities contained no fluid, and there were no pleuritic adhesions.

Heart. The pericardium was anæmic, and contained two ounces of straw-colored serum. The heart was slightly larger than normal: its muscular tissue was pigmented and anæmic, and contained a great deal of fat. All its cavities were dilated, and contained pale yellowish clots and watery blood. The valves were normal. There was a very small amount of pericardial fat. The coronary arteries were normal. The aorta was normal.

Lungs were pale and very œdematous. They were fairly well supplied with air. The bronchial tubes contained frothy mucus and pus. The mucous membrane of the bronchi was intensely anæmic.

Spleen was double the normal size. It was normal in consistency, and deeply pigmented.

Kidneys. The left was larger than normal. The capsule was not adherent; the surface was smooth and pale; the cortex was swollen; and the markings were very indistinct. The right was normal in size; the capsule was not adherent; its surface was a trifle granular and congested; its markings were indistinct. There was fat in the cortex and pyramids of both kidneys.

Stomach contained a small quantity of fluid food. The mucous membrane in contact with the food was macerated, and the veins of the submucosa in the fundus of the stomach were prominent. The mucous membrane of the stomach not in contact with its fluid contents was pale

and smooth, and to the unaided eye appeared normal. The stomach wall, especially that portion of it in contact with the fluid, appeared thinner than normal. The calibre of the pylorus was normal.

The *œsophagus* was normal.

The *pancreas* was normal in size, and anæmic.

The mucous membrane of the *duodenum* was pale, and covered with light colored bile. The orifice of the common bile duct was pervious.

Liver was normal in size. The gall bladder was normal. There was a great deal of fat in the liver, and its cut surface was everywhere stained with bile.

Intestines. The mucous membrane of the intestines was anæmic throughout. The muscular wall was normal.

Suprarenal capsules were normal in size; the cortex of each contained a very great deal of fat.

Bladder, urethra, and *thoracic duct* were normal.

HISTOLOGICAL EXAMINATION.—*Heart.* The muscular tissue in the walls of the auricles was granular and moderately fatty.

The muscle of the right ventricular wall contained a great deal of fat; hardly any of the transverse striæ could be seen, and many of the cells had undergone complete fatty metamorphosis. The fatty degeneration was still more marked in the wall of the left ventricle, where extensive areas of muscular tissue had undergone fatty degeneration, and nowhere in them could the transverse striæ be seen. There was only a trace of fat in the planes of fibrous tissue in the ventricular walls. The bloodvessels were normal.

Suprarenal capsules. There were extensive areas of fat in the cortex of each organ. In places the parenchyma of the organs had so completely degenerated that only the stroma could be recognized, infiltrated with fat. Some of these areas of fat were very sharply defined, the cortex in their immediate neighborhood being normal. The medulla of each capsule was normal.

Kidneys. The epithelium lining the tubules everywhere had undergone fatty degeneration. The fat was more abundant in the tubes of the cortex and in the collecting tubes. Many of the tubes appeared filled with oil globules of various sizes. There were granular casts in the straight and collecting tubes. The fat was not confined to the tubules, but was seen in very fine globules in the stroma. When hardened in alcohol and stained with carmine, the stroma was seen to contain many small round cells, in places, in aggregations of considerable size.

Spleen. The microscopic examination of the spleen was negative.

Liver. There was a very great deal of fat in the liver. Very generally the fat was evenly distributed throughout the lobules; some of the lobules, however, were more fatty at the periphery than in the interior. The central vessels were dilated, and the liver cells in their neighborhood were atrophied.

Brain. The microscopical examination of the vessels of the brain revealed nothing unusual.

Sympathetic ganglia. The ganglia of the sympathetic nerves were normal.

Stomach. The mucous membrane of the stomach consisted of a stroma everywhere infiltrated with the small, round cells so common in inflammatory processes. Sections for microscopic examination were made from the pylorus and at varying distances along the greater and lesser

curvatures ; and of the anterior and posterior walls, to the level of the fluid within the organ.   Extensive areas of the mucous membrane presented no trace of the gastric tubules.   In none of the sections were normal tubules found ; in several, the more superficial portions of the tubules were recognizable, lined with cylindrical epithelium.   The epithelium in the recent state was granular and fatty ; small granules of fat were seen in the stroma of the mucosa.   There were numerous droplets of hyaline material which was soluble in alcohol when submitted to its action for weeks.   It was not readily colored by osmic acid.   It did not dissolve in ether, and it stained slowly with the aniline colors.   This hyaline material in places took the shape of the tubules.   Near the surface of the mucosa there were seen irregular flat cells which might be regarded as coming from the deeper portion of the gastric tubules.   These were granular and distinctly nucleated.   There were numerous small bodies, many of them triangular, highly refractive, the size of pus cells, seen generally distributed throughout the mucous membrane.   In places they were aggregated into colonies.   They stained very slowly with the aniline dyes, not at all with osmic acid ; were dissolved in alcohol after the lapse of seven to ten days.

The submucosa was normal.   The muscularis mucosæ was normal.

The muscular wall of the stomach was normal.   The bloodvessels were normal.

The intestines were not examined.

Marrow. There was no fat in the marrow of the long or short bones. The marrow in both localities was similar in appearance to the unaided eye, and was the same under the microscope.   The absence of fat was the special feature noticeable.   There was an absence of multinuclear cells. Several of the Charcot-Neumann crystals were seen in the marrow of both the long and short bones.   There were no nucleated red cells seen.[1]

RÉSUMÉ.—*Clinical.*   A history of periodical alcoholism ; of excellent health previous to eight months before the patient's admission to the hospital ; of anorexia and inability to take food for four months ; of the symptoms of a gradually developing anæmia and of prostration ; of an excessive and rapid loss of flesh.   The occurrence of retinal hemorrhages, the presence of an irregular temperature curve ; continuous emaciation, and rapidly increasing asthenia during the period of observation. Megalocytes and poikilocytes present in the blood in large numbers ; microcytes in considerable number.   Red blood-corpuscles finally reduced to 1,020,950 ; the relative percentage of hæmoglobin remaining normal.   Death by asthenia three months after admission to the hospital.

Anatomical.   Extreme anæmia and emaciation ; fatty changes in all the organs ; disappearance of fatty tissue in the marrow of the long bones ; almost complete destruction of the secretory tubules of the stomach.

[1] Dr. Ferguson, during the past two years, has made histological examinations of more than one hundred stomachs of patients dying of various diseases, and he informs me that in this series he has never observed either the presence in the mucosa of the peculiar hyaline material noticed in the above cases, or a similar extensive destruction of the gastric tubules.   Pernicious anæmia was not present in any of the cases of the series.

Remarks.—The patients whose histories have been related, presented a clinical picture, in a very typical way, of the group of symptoms which are regarded as pathognomonic of progressive pernicious anæmia.

Both patients gave a history of a probably excessive use of alcohol. The influence of this habit in the production of the pathological process is difficult to determine. In none of Fenwick's[1] cases was there a history of alcoholism; and no mention of it occurs in Nolen's,[2] Quincke's,[3] and Brabazon's[4] cases. On the other hand, the alcoholic habit extended over a period of many years in Henry's and Osler's[5] case, and was regarded by them as "playing a part in the causation of the atrophy." In three out of eleven cases of alcoholism, Hanfield Jones[6] found extensive destruction of the gastric tubules. In Dr. Ferguson's[7] series of one hundred cases, in which a histological examination of the stomach was made, the only considerable degeneration and destruction of the tubules, exclusive of the author's cases, was observed in patients who had suffered from chronic alcoholism.

In both cases the interesting and now well recognized fact in this disease, of a richness in hæmoglobin of the individual corpuscles greatly in excess of that observed in all other forms of anæmia, indeed, equalling that present in health, is clearly illustrated. An increase in the corpuscular richness of the blood and a *proportionate* increase in the percentage of hæmoglobin, corresponding with temporary improvements in the patient's condition, is noticeable in Case I. It will be seen that the average daily excretion of urea was normal, throughout the period of observation, in both cases.

The history in Case I of gastric symptoms, anorexia, and emaciation, distinctly and for a long period *preceding* the appearance of anæmia, and in Case II., the existence of anorexia and inability to take food, with rapid and excessive loss of flesh, also distinctly *antedating* the development of anæmic symptoms, strongly favor the view, from a clinical standpoint, of the *secondary* occurrence of the latter. The pathological considerations in support of the primary nature of the gastric atrophy, will be discussed later. It remains to consider the pathogenesis of the gastric lesion.

That the changes observed in the mucous membrane of the stomach were not due to post-mortem solution or cadaveric change, did not admit of question to the observers. In both cases, all the sections described, were made *above the point of contact* of the fluid in the stomach with the mucous membrane; sections of the lesser curvature and in the immediate neighborhood of the pylorus, showed the presence of changes similar in kind and almost similar in degree to those found in other areas not in contact with the fluid; the mucous membrane above the point of

[1] Loc. cit. [2] Loc. cit. [3] Loc. cit. [4] Loc. cit. [5] Loc. cit. [6] Loc. cit. [7] Not yet published.

contact with the fluid, presented no trace of superficial softening. The more superficial portions of the glandular structure were those least involved, the greatest destruction affecting the deeper portions of the tubules.[1] A post-mortem solution capable of causing such general destruction of the deeper portions of the secretory structures, would very certainly involve the subjacent tissues; and finally there existed a very general infiltration of the mucous membrane with new elements (small cells of inflammatory origin).

Pathological as well as clinical considerations strongly support the view that the very extensive destruction of the gastric tubules cannot be regarded as secondary, and as similar in its origin to the fatty degeneration observed in the other viscera. Extensive fatty changes of the viscera are observed in various chronic non-infectious and acute infectious diseases, with a very moderate degree of fatty degeneration and with little, if any, destruction of the glandular structures of the stomach.

Fatty degeneration of the various tissues of the body is justly regarded in many instances as a consequence of an impediment to, or an arrest of nutrition; *the dense and general small-celled infiltration of the gastric mucosa cannot, however, be regarded as the result of an impaired nutrition, and in itself would account for the degeneration and atrophy of the gastric tubules.*

Gradual destruction of the glandular tissues of the stomach, *consequent* impaired nutrition and fatty changes in the other viscera, would seem to represent the probable sequence in the author's cases.

The supposition of a creeping ulceration in explanation of the gastric lesion is untenable. That the degenerative changes were not dependent upon an arterio-sclerosis or endarteritis, is evident from the absence of appreciable change in the gastric vessels.

Hanfield Jones,[2] as a result of his extensive histological investigations, first expressed the opinion that in some instances "the gastric tubules undergo spontaneous degeneration, or at least not from atrophic pressure of new formed fibroid tissue," and stated that "the mucous membrane then presented a mere mass of granular and colloid débris, with interspersed fat globules and fatty matter." Other observers, who believe that a primary atrophy of the stomach occurs, maintain that it results from interstitial inflammation alone.

In the author's cases the general and very dense small-celled infiltration of the mucous membrane points strongly to the probable dependence of the atrophy upon an inflammatory process. Other elements observed in the gastric mucosa may be regarded as the probable products of degenerating tissues.

A study of the cases related would seem to justify the opinion pre-

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[1] A similar condition was observed by Fenwick, Osler, and others.   [2] Loc. cit.

viously expressed that " a primary atrophy of the gastric mucous membrane occurs, and that in this lesion is to be found an explanation of certain cases of pernicious anæmia."

A CASE OF SUBCUTANEOUS NODULES IN THE HANDS OF A RHEUMATIC PATIENT.

By George S. Middleton, M.A., M.D.,

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Mrs. L., aged thirty-nine, presented herself at the outdoor department of the Glasgow Royal Infirmary in November, 1886, complaining of rheumatism, and of painful subcutaneous growths on the fingers of both hands.

She had an attack of acute rheumatism when thirteen years of age, and a second in September, 1883. Between these two attacks, and since the last one, she has frequently suffered from rheumatic pains in various joints, such as the knees, ankles, wrists, and finger-joints, accompanied by some swelling of the parts, but not with distinct fever, and not confining her to bed, unless occasionally for a day. There is no cardiac murmur. There is nothing in the history to suggest the existence of a syphilitic taint.

The swellings on the fingers began during convalescence from the second attack of acute rheumatism, in September, 1883. According to the patient's statement, they were not at first permanent, coming and going; but they have been present more or less, as they are now, since early in 1884, though they are said to vary in size and in hardness.

They began as flattened elevations of the skin, and the most recent ones present something of that appearance now. But the majority are distinctly circumscribed tumors, some the size of a pea, others the size of a small hazelnut. The larger ones are lobulated, being apparently composed of two or more that have coalesced. A few of them feel soft and elastic, but in none is there any indication of fluctuation ; the rest are hard, like cartilage, but none have either a chalky or a bony hardness. During the eight months she has been under observation, it cannot be said that they have distinctly varied either in size or hardness, although she herself is of opinion that they have.

The most striking swellings are on the flexor aspects of the fingers, which, as will be seen in the woodcut (from a photograph by Dr. Macewen), present something of the appearance of a knotted blackthorn stick. There are between twenty and thirty growths on the fingers of

the right hand, and between ten and twenty on the left; it is difficult to state the exact number, owing to the fact that so many have coalesced. They are freely movable on the subjacent structures, but the skin is adherent to all but two of these tumors on the fingers. Over many of
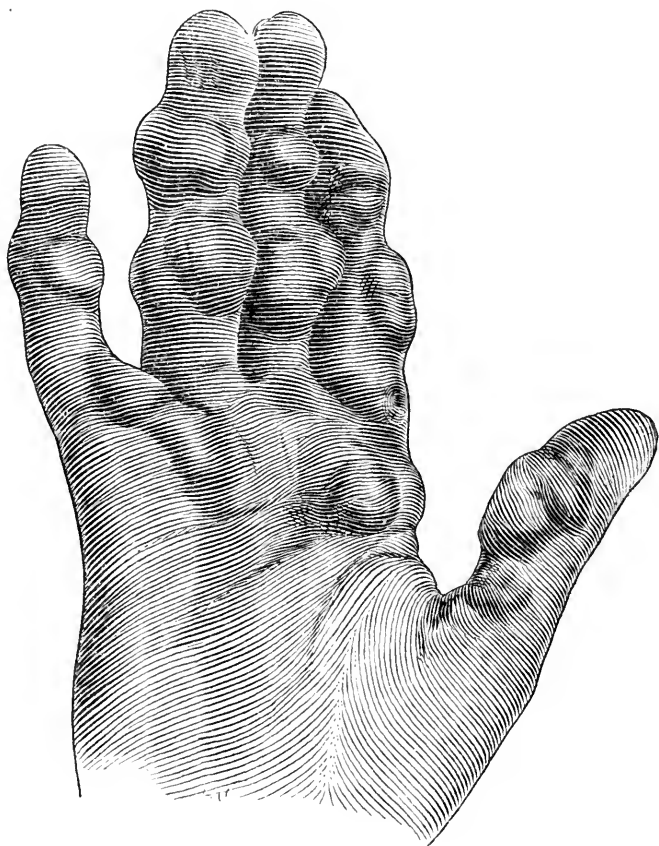
them the skin is thickened, and the superficial layers are rubbed off. Many of them present a dull, whitish appearance, intensified by drawing the skin tightly over them. They are itchy, and sore when rubbed. At times they are quite free from pain, but they are very liable to become painful; and the pain in them is most acute when they are growing, during the prevalence of east wind, and just prior to rainy weather. Putting the hands in cold water always causes pain. They have occasionally bled, as after rubbing them, or after a heavy washing of clothes. They have never suppurated.

A few similar swellings are said to have been seen on the toes, but have disappeared. There are none on the scalp, and none on the ears. The only other situation where a swelling of apparently the same characters is met with is at the right elbow. On the right olecranon there is a prominent swelling, which appears to consist of a deep, hard, bony growth, immovable, and quite different from the above, with a mass of softer material like a bursa over it. Distal to this, there is a small,

movable tumor felt under the skin, to which, however, it is not adherent, and probably of the same nature as the growths above described.

At the knuckles there are smaller swellings, which, however, do not seem to have attracted her attention. They are not like the above, but resemble fusiform enlargements of the sheaths of the tendons, with which alone they move. They are not so circumscribed as those already described, and they have no connection with the skin. They are present on all the knuckles, except those of the little finger and thumb on the right, and of the thumb on the left hand.

There is distinct crepitation felt at the knuckles of the left hand, especially on the flexor aspect, and on the ring finger more than elsewhere. In the sheaths of the flexor tendons, both above and below the annular ligament at both wrists, there is crepitation on movement, and several bodies are felt moving along with the movement of the tendons, but not capable of being pressed from the distal to the peripheral side of the ligament. They resemble the loose bodies sometimes found in this situation, but are less movable and fewer in number.

Various remedies were tried to relieve the pain, the one that seemed of most use being a combination of bromide of potassium and liquor arsenicalis.

The case was shown at the Pathological and Clinical Society of Glasgow in December, 1886, when Drs. Macewen and Newman were appointed, along with myself, a committee for its further investigation. Recently, having obtained the patient's consent, Dr. Macewen removed a mass from the front of the left thumb, and found it to consist of two separate tumors, the one single, the other composed of three that had coalesced. The tumors were adherent to the skin, hard, and distinctly circumscribed, but without any capsule; and in their removal the sheath of the tendon was exposed, but there was no adhesion to it. On section, the tumor was white and glistening, like fibrous tissue.

On microscopic examination we found "that where the tumor has approached most closely to the surface, and is most dense, the papillæ of the skin have become obliterated, and the layer of epithelium attenuated, the stratum corneum being reduced to about one-third of its normal size. In passing from that area, papillæ again present themselves, small in size, and gradually increasing on receding from this centre. Where the papillæ are lost, the bloodvessels have also in the main disappeared. The growth as a whole is made up of connective tissue in various stages of development. In its substance there are scarcely any bloodvessels, but at its periphery the arteries seem to be abnormally numerous, and in many instances their coats are greatly thickened by infiltration with cells, the tunica intima being frequently particularly affected. In one instance, besides accumulation of cells in the intima and in the adventitia, there is a collection of cells dissecting the middle coat, which is

also greatly thickened.   Collections of these cells frequently extend to a considerable distance from the vessels, and in many sections they map out the course of the minute vessels in the papillæ of the skin.   Glandular tissue and fat are almost entirely absent."

As regards its structure, the most striking feature is the condition of the vessels, from which it might be inferred that the lesion has its origin in them, as if from some irritant carried by the blood.

The close relationship between the origin of these tumors and an attack of rheumatic fever, and the fact that they are now also most painful when she suffers from rheumatic pains in the joints, lead me to believe that they are of rheumatic origin, a belief strengthened by the absence of anything in her past history to suggest a syphilitic taint.

In connection with this case, my attention has been directed to a paper on "Subcutaneous Nodules connected with Fibrous Structures Occurring in Children the subjects of Rheumatism and Chorea," by Drs. Barlow and Warner,[1] and to cases shown at the Clinical Society, London, by Drs. Dyce Duckworth,[2] Stephen Mackenzie,[3] and Kingston Fowler.[4]   The case above recorded differs in many respects in its clinical features from those recorded by them, while in its microscopic characters it closely resembles the tumors they examined, with, however, some points of difference.   I am inclined, therefore, to agree with Dr. Duckworth when he says that "a more extended study of these cases will show that there are several types or varieties of them."   Indeed, since my attention has been directed to the subject, I have been led to believe that subcutaneous nodules on rheumatic hands are more common than one would suppose, from the references made to them in literature, by the fact that I have seen at the Royal Infirmary Dispensary several cases presenting such nodules.

GLASGOW, July, 1887.

CIRCULAR SUTURE OF THE INTESTINE—AN EXPERIMENTAL STUDY.[5]

BY WILLIAM S. HALSTED, M.D.,

OF NEW YORK.

AMONG the most brilliant triumphs of modern surgery are those which have attended operations involving laparotomy.   We can offer a scientific explanation why many abdominal operations—above all, ovariotomy—should succeed so well even without the use of antiseptics.   The

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[1] Trans Internat. Med. Congress, London, 1881, vol. iv. p. 116.

[2] Clin. Soc Trans., vol. xvi. pp. 52, 190   [3] Ibid , p. 188.   [4] Ibid , vol. xvii. p. 65.

[5] My experiments were completed April 1, 1887, and in a lecture which I delivered at the Harvard Medical School, April 5, 1887, I gave in substance what I have written for this article.

chief danger of these operations is the development of peritonitis of a septic or purulent nature. Contrary to former beliefs Wegner[1] demonstrated experimentally that the mere exposure of the peritoneum to the air does not cause peritonitis. The recent experiments of Grawitz[2] have shown that the access of the microörganisms of suppuration to the peritoneal cavity does not alone suffice to induce peritonitis. The absorbing power of the peritoneal surfaces is very great and, under favorable circumstances, pyogenic substances are quickly absorbed from the peritoneal cavity without causing suppurative inflammation. In confirmation of the experiments of Grawitz I have inserted pure cultures of the pus organisms, as well as small pieces of suppurating tissue and particles of feces, into the peritoneal cavities of dogs without producing peritonitis.

Accessory causes must be present in order that pyogenic substances may induce purulent peritonitis. These accessory conditions, various as they may be, have in common the attribute that they prevent absorption or removal from the peritoneal cavity of pyogenic substances, more particularly of the bacteria of suppuration.

Without entering into a detailed consideration of these conditions, the following may be mentioned as of especial importance in surgical operations involving the peritoneum : the presence in the peritoneal cavity of blood or other stagnating fluids, the existence of necrotic, wounded, or diseased tissue in connection with the peritoneal cavity, and the presence of some focus from which pyogenic bacteria may enter the peritoneal cavity in larger number or more rapidly than they can be absorbed. It is evident that bacteria, which otherwise would be readily absorbed, may take lodgement and grow, if they find in the peritoneum stagnating nutritive fluids or ulcerated and necrotic tissue. For manifest reasons dead spaces, which play such an important *rôle* in suppurative inflammations elsewhere, are less likely to be formed in the peritoneal cavity than in most other situations.

The experimental results which have been mentioned and the deductions from them enable us to explain the brilliant success of skilful ovariotomists, even when, like Lawson Tait, they ostentatiously discard the use of antiseptics.

In striking contrast to the results of ovariotomy are those of intestinal suture. Not but that here, too, brilliant successes have been recorded, but the death-rate attending enterorrhaphy has been large, and, in general, the operation, even in the hands of the most skilful surgeons, has been capricious in its results. While admitting that an operation so delicate and so difficult in its technique as enterorrhaphy should be judged not by statistics collected at random from all possible sources, but by the results of individual operators of approved knowledge and skill, it

[1] Wegner. Arch. f. klin. Chirurgie, Bd. xx.   [2] Grawitz: Charité-Annalen, Jahrg. xi.

yet remains true that even from this point of view the results are not satisfactory, although they are such as to encourage further efforts in perfecting the operation.

In the hope that an experimental investigation of the subject of intestinal suture might contribute somewhat to our knowledge of the causes of failure as well as of the conditions of success of enterorrhaphy, I have undertaken during the past winter a series of experiments in the Pathological Laboratory of the Johns Hopkins University, in Baltimore. I wish on this occasion to express my thanks to Prof. Wm. H. Welch, the Director of the Laboratory, for his kindness and advice, and also to acknowledge my indebtedness to Dr. F. P. Mall, Fellow in Pathology of Johns Hopkins University, for his kind assistance in the operations, and especially for calling my attention to many points concerning the minute anatomy of the intestine. Dr. Mall's suggestions were of great value to me.

The experiments were performed upon dogs, anæsthetized usually with morphine and ether; they include sixty-nine circular resections and circular sutures of the small intestine.

The history of the operation of intestinal suture has been described so often and so well that it is not necessary in an experimental study of the subject to go over this historical ground again.

Before describing my experiments, I wish to call attention to certain points relating to the anatomy of the intestinal wall, a knowledge of which is of the utmost importance to the surgeon who performs intestinal suture. In looking through the literature of intestinal suture I cannot find that any one has called sufficient attention, from a surgical point of view, to the structure of the different coats of the intestine, particularly to their physical properties. Indeed, the descriptions in surgical text-books, as well as in monographs and articles treating especially of intestinal suture, and the drawings which are frequently inserted to elucidate the subject, lead me to believe that the current ideas among surgeons are not only incomplete, but absolutely incorrect as regards some important details in the structure of the intestinal coats. If these errors related to matters of only histological interest their practical bearing would be very slight, but my experiments have led me to attach great weight, in the successful performance of enterorrhaphy, to an accurate knowledge of the thickness and physical characters of the submucous coat of the intestine, and I am not aware that the importance of this coat in connection with this operation has hitherto been emphasized.

The old views of Jobert and Lembert as to the structure of the intestinal wall seem to have been adopted by modern surgeons with little or no modification. The peritoneal coat, for instance, is believed to be thick enough and sufficiently strong to hold a stitch, and the existence

of the submucosa, for us the most important coat, has been generally ignored.

A few quotations from recent writers will substantiate these statements. Thus Madelung,[1] in his admirable contribution to intestinal suture, writes, "The needle now penetrates in the usual manner the two ends of the intestine, passing between serosa and muscularis." Reichel[2] insists upon the accurate "adaptation of the two edges of the wound, particularly of the serous coats," and, having described the manner of taking the first row of stitches, continues, "over this comes then the external suture which includes only the serosa." Maydl,[3] Kocher,[4] and many others could be quoted in the same sense to show the prevalence of the idea that intestinal surfaces may be sutured by stitches including only the serous membrane.

I fail, moreover, to find in the writings of Gussenbauer, von Winiwarter, Kocher, Czerny, Rydygier, Madelung, Reichel, Maydl, and others the proper importance attached to the inclusion of a portion of the submucosa in suturing the intestine. The following quotations will suffice to show how little importance, from a surgical point of view, has been attached to the submucosa.

Reichel[5] completely ignores the existence of the submucosa when he says, "It is to be recommended in making the internal row of sutures, after carefully turning in the mucous membrane, to stick the needle close in front of the edge of the wound through the serosa and muscularis, and to draw it out at the edge of the wound between the muscularis and mucosa, and on the other border to proceed in reverse order."

Maydl,[6] too, recognizes but three coats, for he writes, "Then the two external, possibly retracted, intestinal coats are to be drawn together by means of several stitches which grasp the entire thickness of the intestinal wall with the exception of the already coaptated mucous coats, whereby serous surfaces when present are brought into broad apposition." Had Kocher appreciated the resistance furnished to the needle on entering the submucosa, he might have explained how perforation into the lumen of the gut is to be avoided, and not merely have said, "The wall of the intestine is not to be punctured in its entire thickness,"[7] and "we passed the stitches according to Lembert through the thickness of the intestinal wall, avoiding, if possible, penetrating the lumen."[8] Czerny, who has for a long time devoted himself earnestly and most usefully to

[1] Madelung : Arch. f. klin. Chirurgie, Bd. xxvii. p 321.
[2] Reichel : Deutsche Zeitschrift f. Chirurgie, Bd. xix. pp. 268 and 270.
[3] Maydl : Allg. Wien. med. Zeitung, October, 1885, p. 475.
[4] Kocher : Centralblatt f. Chirurgie, 1880, No. 29, p. 466.
[5] Reichel : Loc. cit., pp. 269 and 270.
[6] Maydl : Loc. cit., p. 489.
[7] Kocher : Correspondenzblatt f. Schweizer Aertze, 1878, p. 155.
[8] Kocher : Centralblatt f. Chirurgie, July, 1880, p. 468.

the subject of intestinal suture, does not refer to the submucosa in describing the technique of the operation.[1]

FIG. 1.
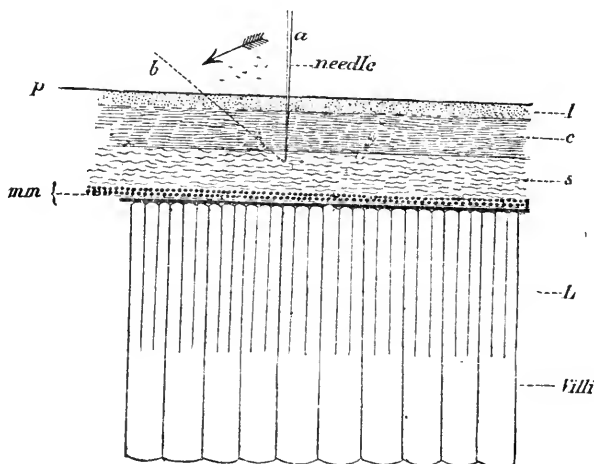
p. Peritoneum.   l. Longitudinal muscular coat.   c. Circular muscular coat.   s. Submucosa.
mm. Muscularis mucosæ.   L. Glands of Lieberkühn.

Fig. 1, kindly drawn for me by Dr. Mall, is a diagram of the wall of the dog's intestine, and is intended to represent accurately the relative thickness of the several coats. The serosa is prolonged beyond the outer muscular coat to emphasize its thinness. Between the submucosa and glands of Lieberkühn—in other words, between it and the lumen of the intestine—practically nothing intervenes; and, literally, nothing but the two layers of muscularis mucosæ and fibrosa mucosæ respectively. Fully two-thirds of the thickness of the wall of the intestine is mucous membrane. When the needle, therefore, has been passed through its outer third it must have entered the glands of Lieberkühn and, hence, the lumen of the gut. It is an easy matter to isolate the submucosa. The outer muscular coats strip from it readily, and the mucous membrane can be rapidly scraped off with a knife. Thus obtained, the submucosa is found to be an exceedingly tough, fibrous membrane. It is air-tight and watertight, and is the "skin" in which sausage meat is stuffed. It is, moreover, the coat of the intestine from which "catgut" is made.

A needle, on being pushed vertically through the wall of the intestine, meets with considerable resistance when it reaches the submucosa; and still greater resistance is encountered if it be attempted to pass the needle horizontally through its meshes. A delicate thread of this tissue is very much stronger and better able to hold a stitch than is a coarse shred of the entire thickness of the muscular and serous coats. Upon the discovery of the latter fact, at which I was, perhaps, as much surprised as most surgeons will be at the statement of it, it naturally

[1] Czerny: Berlin. klin. Wochenschrift, November, 1880, p. 641, et. seq.

occurred to me that it would, if feasible, be well to include a portion of
the submucosa in the suture. Before attempting this, however, I wished
to test the merits of a suture which included nothing but the serosa and
muscularis, and I, therefore, performed the following experiment:

EXPERIMENT A.—Small young dog. Operated on January 18, 1887.
Irrigation with solution of corrosive sublimate, 1 : 1000. Needles with *dulled
ends* employed for sewing. Circular resection of intestine. Two rows of in-
terrupted stitches passed as deep as, but not including any portion of sub-
mucosa—suture of muscular coat. The stitches tore out badly (particularly
those of the first row) and had to be frequently retaken.
January 23. Dog found dead. *Autopsy:* Suppurative peritonitis; sutures
had given way completely.

Blunt needles were used in the foregoing experiment to enable me to
penetrate down to, and no deeper than the submucous coat. Dr. Mall
had previously called my attention to the fact that, with the eye-end of
a needle, one could not unwittingly puncture the submucosa ; for the
force required to enter it at all with the rounded end of a needle is suf-
ficient to perforate it, and, that too, not without a positively unmistak-
able and characteristic jerk. I soon discovered that, even to the
sharpened end of a needle, sufficient resistance is offered by the sub-
mucosa to be easily appreciable, and that it is possible and, with very
little practice, not difficult, to pick up at each stitch a thread-like piece
of submucosa without incurring the danger of passing into the lumen
of the gut.

Persuaded by Experiment A, and others of a similar nature, that the
musculo-peritoneal suture is not to be trusted, I performed Experiments
B and C in order to test the advisability of taking up, with each stitch,
a thread of the submucosa.

EXPERIMENT B.—Medium-sized dog. Operation January 18, 1887. To
include in each stitch a thread of submucosa. Irrigation with solution of
corrosive sublimate, 1 : 10,000. Glass clamps ; suture, catgut. Two rows of
interrupted stitches.
January 25. Dog has been doing very well ever since the operation.
February 19. Apparently perfectly well. Killed. *Autopsy:* Circular intes-
tinal wound perfectly healed; no adhesions, except slight ones over the line
of suture anteriorly.

I wish to call attention here to a point to be emphasized more promi-
nently later, viz., that whereas in Experiments 1 and 2 of Group I., the
adhesions were, as we shall see, extensive enough to have eventually
caused death in one case, and to have threatened it in the other, in
Experiment B they were strikingly trivial.

EXPERIMENT C.—Operation January 20, 1887. To reverse about one foot
of intestine. (This operation was done for a purpose not belonging to the
subject of this article.) Steps of operation: 1. Complete section of intestine
in two places, about one foot apart. 2. Afferent (proximal) ends stitched
together. 3. Efferent (distal) ends brought together over the line of suture
of afferent ends, and sutured. Straight needles. Two rows of interrupted

silk stitches. With each stitch a thread of submucosa was taken up. Irrigation with solution of corrosive sublimate, 1 : 10,000.

Dog died of shock a few hours after operation. *Autopsy*, by Dr. Mall: Careful examination of suture made, to ascertain if any of the stitches had penetrated into the lumen of the gut; not one was found to have done so. No peritonitis.

This experiment was a satisfactory one to me, in that it demonstrated the feasibility of carrying the stitches into the submucosa.

To satisfy my curiosity, I made experiments D, E, and F.

EXPERIMENT D.—Small, brindled and white bulldog (pup).   Operation January 29, 1887.   To suture the submucosa alone.   1. Split muscularis for about two centimetres from cut edges along mesenteric and free borders of intestine.   2. Stripped back the muscular flaps thus marked out and exposed two centimetres of submucosa.   3. Applied two rows of interrupted stitches to the exposed submucosa, appropriating but a thread of it to each stitch.   4. Sewed the musculo-peritoneal flaps together over the line of the circular suture.

January 31. Dog found dead.   *Autopsy:* Complete slough of flaps, and gaping of circular wound.

EXPERIMENT E.—Large, long-haired, white dog.   Operation January 21st. Circular suture of submucosa alone.   1. Circular division of musculo-peritoneal coat, and stripping off of cuffs to expose about one centimetre of submucosa.   2. Buried-knot quilt (*vide* Fig. 2) stitches applied before completing the section of the gut.   3. Section of gut completed, and buried-knot quilt stitches tied.   4. Two rows of continuous submucosa suture.   5. Cut edges of musculo-peritoneal cuffs turned out, and the under surface of the cuffs coaptated, and held by a few stitches.

February 1. Dog is dead.   *Autopsy:* Submucous stitches still hold; but gangrene, starting from the musculo-peritoneal cuffs, extends for about one foot above the circular suture.

EXPERIMENT F.—Operation same as in Experiment E.   Dog died of ether.

We are now prepared to consider my first series of operations. In order to classify conveniently the modes of suture, the experiments will not be numbered precisely in the order in which they were performed.

GROUP I.—LEMBERT'S STITCHES.

EXPERIMENT 1.—Small, young, black bitch.   Operation January 6, 1887. Resection of about two and a half inches of small intestine.   Glass-slide clamps.   Irrigation with solution of corrosive sublimate, 1 : 40,000.   Suture, fine sublimate silk.   Two rows of interrupted stitches.

January 7. Dog walks about.   Is not much depressed.   Vomits occasionally.   Has been seen to pass, per rectum, a few drops of blood-stained mucus.

8th. Dog is playful.   No evidence of peritonitis.   Takes milk.

11th. Apparently perfectly well.

February 7. Dog emaciated almost to a skeleton.   Has refused food for about one week.   Is evidently dying of starvation.   Killed.   *Autopsy:* Line of suture adherent to adjacent intestines.   Several acute bends in intestine, two or three inches apart, caused by adhesions.   Intestine nowhere dilated. Mucous membrane at the line of suture quite flat.

Riedel[1] relates a similar case, the death of a dog from inanition, due to finger-like bending of the intestine, without dilatation or other evidences of obstruction.

[1] Riedel: Deutsche Gesellschaft für Chirurgie, 1883, p. 25.

EXPERIMENT 2.—Medium-sized, gray dog. Operation January 19th. No antiseptics. Irrigation with warm physiological salt solution. No clamps. Suture, two rows of Lembert's stitches. Fear that too much tissue has been turned in.

January 25. Dog has not been very lively since the operation, but takes milk naturally.

27*th.* Dog appears better.

February 1. Seems perfectly well.

2*d.* Killed. *Autopsy:* Omentum adherent over line of suture; numerous other adhesions. Intestine, above suture, dilated to about four times its natural size. Suture perfectly firm. ·

EXPERIMENTS 3, 4, 5.—Operations December 12, 13, and 14, 1886. To isolate loops of intestine. Double circular resection, and double suture. Suture, horse-hair.

All three cases died within two or three days of the operation, from purulent peritonitis.

EXPERIMENT 6.—Young, small, brindled dog. Operation January 9, 1887. To isolate loop of intestine. 1. Intestine divided in two places, about one foot apart. 2. Ends of gut thus isolated, sewed together. 3. The remaining ends stitched together to establish the intestinal continuity. Irrigation with solution of corrosive sublimate, 1:4000. Glass clamps. Suture, fine sublimate silk. Czerny's "Étagennaht." Operation lasted two hours. As the abdominal wall was being sewed, fresh ether was administered, and the dog died of respiratory paralysis. The heart continued to beat for more than fifteen minutes after the respiration had ceased. No attempt was made to revive the animal by artificial respiration.

EXPERIMENT 7.—Small, brindled bitch. Operation January 10, 1887. To isolate loop. Steps of operation the same as in Experiment 6. Czerny's suture. Twenty minutes required for the loop suture, and fifteen minutes for the continuity suture. One hour and fifteen minutes for the entire operation. Dog ceased breathing as abdomen was being sewed. Heart continued to beat. Artificial respiration employed for thirty minutes before active respiration became reëstablished.

January 11. Dog still alive, and able to walk. No vomiting. Natural stool.

12*th.* Found dead. *Autopsy:* Local peritonitis referable to sutures. Each stitch occupies a focus of pus. Conclude that the silk used may not have been sufficiently disinfected, for it was not placed in the sublimate solution until just before the operation was undertaken.

EXPERIMENT 8.—Rather large, black and white dog. Operation January 8, 1887. To isolate loop of intestine. Irrigation with solution of corrosive sublimate, 1:10,000. Glass clamps. Suture, catgut; Hagedorn's needles. Three rows of Lembert's stitches. Many of the stitches tore out, and had to be reapplied. Some, certainly, perforated into lumen of gut. Expressed myself at the time as being dissatisfied with the operation. Felt sure that the dog would die, because I thought that I had been unusually clumsy in my technique.

January 9. Dog lively, and seems well.

25*th.* Dog has not had a bad symptom since the operation.

February 1. Not so well.

3*d.* Refuses both meat and drink.

9*th.* Dog is evidently starving to death. Reopen abdomen, find many and very strong adhesions. Both circular sutures firm. The isolated loop is distended to about the size of an inflated human transverse colon, with fecal-smelling, thick, brownish-gray fluid; and its wall is two or three times as thick as normal.

That these cases (Group I.) testify to the defectiveness of my technique, I am eager to admit; at the same time I find no proof that the method of any one else has been otherwise than very uncertain. The single-

resection experiments (Group I.), although they might be called successful, must, when contrasted with Experiment A, and with those which are to follow (Group II.), be regarded with dissatisfaction. The serious adhesions which were present in the former cases, indicate an imperfect method ; and in the absence of any such in the latter lies the promise of a better technique. The most favorable accounts of single resections on dogs come from Madelung and Rydygier. The one reports nine, and the other ten experiments as successful.

Studying Rydygier's cases,[1] I observe that, whenever an autopsy was made, extensive adhesions were found, as is evident by the following quotations :

"EXPERIMENT 1. * * * The site of resection is bound by adhesions to the contiguous loops of intestine."
"EXPERIMENT 2. * * * The intestinal loops which lie near to the site of resection, are bound together by adhesions."
"EXPERIMENT 3. * * * The site of resection, which is completely healed, is bound by adhesions to the abdominal wound ; furthermore, several loops of intestine are glued together."
"EXPERIMENT 4. * * * The abdominal wound is healed, and the omentum is adherent to it. Several loops of intestine are matted together about the site of the resection, and in separating them the intestinal suture gives way to a slight extent."

Furthermore, of the six unautopsied animals, not one, perhaps, had lived long enough, at the time of Rydygier's writing, to justify the belief that death from adhesions might not ultimately have ensued.

Rydygier's tenth experiment was made September 7th, and on the 10th of October of the same year his article appeared.

We cannot analyze Madelung's work on dogs, because he has not thought it worth while to detail his experiments. In recommendation of his "Knorpelplattennaht," he says:[2]

"I wish to say in its favor, that in the nine experiments on animals in which I performed in this manner circular intestinal and gastric resection, an immediate and complete union took place in every instance. In no instance did escape of feces take place. I do not think it worth while to give a detailed account of these experiments, which were instructive enough to me."

I have no doubt that the results of the gentlemen just quoted, were much better than I could have obtained by their methods as they describe them ; for each, with his great experience, must have acquired an *art* of sewing which, from a *scientific* standpoint, is not sufficiently precise to be communicated to others.

To read Kaiser's[3] experiments is to become convinced of the uncertainty with which, in the taking of stitches, he must contend who does not avail himself of the guidance offered by the submucosa.

"EXPERIMENT 1. * * * Autopsy reveals a silk thread projecting into the lumen of the intestine, about which there is a small lens-like depression."
"EXPERIMENT 3. * * * On the stomach, on its inner side, one recognizes the cicatrix in the slightly elevated ridge. On the duodenum, very close to the cicatrix, are two silk ligatures which lead into two small pouches."

The fact that both of these experiments succeeded notwithstanding that, in each, stitches had been passed into the lumen of the intestine or

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[1] Rydygier : Berlin. klin. Wochenschr., 1881, p. 593.   [2] Madelung, l. c., p. 323.
[3] Kaiser : Beiträge zur Operativen Chirurgie (Czerny), 1878, p. 142.

of the stomach, makes it more than probable that Kaiser is not the only one who, in spite of an imperfect technique, has had good results.

The experiments of mine to which I particularly wish to invite attention are those of Group II. In all of the operations of this group the plain-quilt submucosa stitches were employed for the complete row; and, in most of them a few presection buried-knot (*vide* Fig. 2 and Group III.) quilt stitches were taken in addition.

Group II. Plain-quilt Submucosa Stitches.

EXPERIMENT 1.—Large, black-and-tan dog. Operation January 25, 1887. Double circular suture: to reverse about one foot of intestine.[1] Irrigation with solution of corrosive sublimate, 1 : 10,000. Glass-slide clamps. Suture. Seven presection stitches in incomplete first row; and ten plain-quilt (postsection) stitches in second row. Intestine well washed with warm water just before being replaced.

January 26. Dog wags his tail, but, otherwise, rather quiet.

February 1. Very lively, and seems perfectly well.

8th. Dog continues to be well.

27th (about five weeks after the operation). Has been losing appetite and spirits for a week or more. Killed. *Autopsy :* Both circular sutures perfectly healed—adhesions not nearly so extensive as in Experiment 8 (Group I.), the successful "Étagennaht" loop case. The further description of the autopsy is reserved for another purpose.

EXPERIMENT 2.—Large, black Newfoundland bitch. Operation February 28th. Double circular suture: to reverse one foot of intestine. Very free irrigation with solution of corrosive sublimate of uncertain strength—probably 1 : 1000. Suture, sublimate silk. Five presection stitches—one complete row of plain-quilt postsection stitches.

March 2. Dog found dead. *Autopsy,* by Dr. Mall: Absolutely no peritonitis and no adhesions. Lines of suture perfectly firm. Unmistakable evidences of too much irrigation, and with a too strong solution of corrosive sublimate. Ulcers of mucous membrane of stomach. Subperitoneal hemorrhages—particularly over bladder, etc.

EXPERIMENT 3.—Very large, black Newfoundland dog. Operation March 4, 1887. Double circular suture : to reverse one foot of intestine. Irrigation with solution of corrosive sublimate, 1 : 20,000. Considerable contamination of sutures and intestines with feces throughout the operation.

March 6. Dog so savage that no one can enter the room in which he is confined.

April 1. Dog has not had a bad symptom since the operation.

May 7. Killed. *Autopsy* made by Dr. Welch, who writes me that the dog "was very weak and emaciated, and could not have lived much longer. We found the same condition of things as in the other case.[2] There was a mass of solid material, made up mostly of bits of straw, wood, and hair, which formed a firm impaction, beginning above and extending an equal distance below the upper suture, but not reaching down more than halfway between the two sutures. The intestine was much distended at the seat of the impaction and also, although to a less extent, above the impaction. There were very few adhesions. The peritoneum was clean, and the intestine beautifully healed at the site of the sutures—the inner surface being perfectly smooth."

EXPERIMENT 4.—Moderately large, yellow dog. Operation February 19, 1887. Single circular resection and circular suture. Irrigation with solution of corrosive sublimate, 1 : 20,000. Suture, sublimate silk. Six presection

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[1] Vide Experiment C.   [2] Experiment 1, Group II.

buried-knot quilt stitches, and one complete row of postsection plain-quilt stitches.

February 20. Dog moderately lively.

March 11. Perfectly well. Killed to make injection of liver. *Autopsy:* Suture perfectly healed. A very few slight adhesions.

EXPERIMENT 5.—Large, white dog. Operation March 5, 1887. Single circular resection and circular suture. 1. Application of seven presection buried-knot quilt sutures. 2. Ligation of vessels by circumvection ("Umstechung"). 3. Application of clamps. 4. Section of intestine very close to presection stitches. 5. Tying of presection stitches. 6. Application of plain-quilt stitches (rather *too far* from cut edge of intestine). 7. Tying of plain-quilt stitches.

March 11. Dog seems perfectly well. Killed to make injection of vessels of circular suture. *Autopsy:* Slight local peritonitis starting from a small necrotic ulcer (ulcer has not perforated gut wall—is rather superficial) very near the mesenteric border, at line of circular suture. This ulcer proceeded undoubtedly from strangulation where the stitches (both rows) were closest together.

EXPERIMENT 6.—Large, yellow dog. Operation March 8, 1887. Single circular resection and circular suture. Intestine cut very close to presection stitches. Postsection plain-quilt sutures applied nearer than usual to the presection stitches.

March 25. Dog has had no bad symptoms since the operation. Killed. *Autopsy:* No adhesions, except a very delicate attachment of omentum to line of suture, anteriorly.

EXPERIMENT 7.—Small, shaggy, yellow dog. Operation March 8, 1887. Single circular resection and circular suture. A few presection stitches: one complete row of postsection plain-quilt stitches.

March 14. Dog has made an uninterrupted recovery. Used for a second experiment for another purpose. Killed. *Autopsy:* No adhesions. Circular suture beautifully healed, but so much intestinal wall had been turned in that some obstruction had been caused—manifested by conical dilatation of intestine, and accumulation in it of hay, on the proximal side of the suture.

This case is one of several which indicate that it is not advisable to make two rows of stitches on small dogs.

EXPERIMENT 8.—Very large, brown dog. Operation March 14, 1887. Single circular resection and circular suture. A few presection and one complete row of postsection sutures. Operation performed without an assistant, and without the employment of antiseptics. No clamps. Irrigation with a solution of common salt, 0.6 per cent., at 37° Cent.

March 25. Dog has made an uninterrupted recovery. Killed. *Autopsy:* No adhesions—not even of omentum to the line of the suture. A very perfect result.

This operation was performed without any antiseptic precautions, and without an assistant; and yet, as the autopsy showed, the result could not have been more perfect.

EXPERIMENT 9.—Rather large, black and white dog. Operation March 18, 1887. Single circular resection and circular suture. A few presection and one complete row of postsection stitches. Even less attention paid to cleanliness than in the preceding experiment: for the dog was operated upon to furnish situations from which to make drawings. About one foot of intestine was exposed outside of the abdominal cavity for more than two hours; and when returned was very blue and much swollen. But the sewing was very carefully and satisfactorily done.

April 1. Dog is very lively, and seems well. Used by Dr. Mall for another

operation. Killed. *Autopsy:* Intestinal wound firmly healed, but the intestines, at the site of the suture, are matted together.

It is not strange that the intestines should, in this case, have been matted together; but rather to be wondered at that, under the circumstances, the dog could have made even such a recovery, indifferent as it appears from our present point of view.

EXPERIMENT 10.—Large, black dog. Operation March 17, 1887. Single circular resection and circular suture. Operation without antiseptics and without clamps. Suture. A few presection and one complete row of post-section stitches. The silk was so very old that it broke often on tying, and many of the stitches had to be retaken. I am quite sure that one—possibly two—of the stitches were passed into the lumen of the gut. More than one foot of intestine allowed to remain outside of the abdominal cavity for one and three-quarter hours. The dog had tapeworm and much feces in his intestine, so that there was a good opportunity for contamination of the wound and of the abdominal cavity. Very free irrigation, during and after the completion of the circular suture, with a warm salt solution—0.6 per cent. Should this case recover, I shall regard it as very strong evidence in favor of my suture.

April 2. Dog lively, and apparently well. Dr. Mall killed the dog, subsequently, and appended the following to the history: *Autopsy:* "No peritonitis. Suture fully healed. A large worm (eustrongylus gigas), alive and active, found in the peritoneal cavity."

EXPERIMENT 11.—Rather large, white bitch. Operation February 1, 1887. Single circular resection and circular suture. One complete row of plain-quilt submucosa stitches (*vide* Fig. 7) applied before and tied after resecting about half an inch of intestine. I found the taking of these stitches very easy, but to resect the gut under them was somewhat troublesome. The method, on the whole, is a moderately rapid one—occupying about forty minutes.

February 2. Dog doing nicely.

26th. Dog perfectly well. Killed. *Autopsy:* No adhesions. A most perfect result.

It will be observed that in this (the foregoing) case, as well as in all of the following cases of this group, the incomplete row of presection stitches was omitted; and that but one row of stitches was employed for the circular suture.

EXPERIMENT 12.—Very large, olive-brown dog. Operation February 1, 1887. Resection of two feet of intestine. I made, at first, a circular suture of Emmert's stitches (*vide* Fig. 8); then, being dissatisfied with the appearance of the suture, I again resected the intestine and applied one complete row of plain-quilt stitches.

February 2. Dog convalescent.

3d. Dog lively, and apparently well.

March 9. Still perfectly well. Killed. *Autopsy:* No peritonitis, and absolutely no adhesions.

The intestinal wound had healed so perfectly that its site was only discovered after Dr. Mall and I, in search of the suture line, had run the intestine several times through our fingers.

EXPERIMENT 13.—Small, shaggy, black dog. Operation February 14, 1887. Circular resection and circular suture. One complete row (eighteen stitches) of plain-quilt stitches. Irrigation with tepid salt (0.6 per cent.) solution, and, sparingly, while tying the stitches, with a solution of corrosive sublimate—1 : 20,000.

February 15. Dog is quiet—still affected by morphine.

16*th*. Dog is very playful.

March 10. Perfectly well. Killed. *Autopsy:* Circular suture perfectly healed. Slight adhesion of the omentum to the line of the suture.

EXPERIMENT 14.—Very small, old, black and tan bitch. Operation February 21, 1887. Circular resection and circular suture. One row of plain-quilt presection sutures (*vide* Fig. 7). Intestine very small; the smallest, I think, that I have ever sutured.

March 7. Dog has been doing fairly well ever since the operation, but has refused food for a day or two.

March 9. Found dead. *Autopsy:* No peritonitis. Near the site of the circular suture the gut is found to be much twisted, and bound in this position by adhesions, in themselves very trivial. Above the twist the intestine is very much dilated. Death from ileus. The suture is most beautifully healed, even to mucous membrane inclusive.

EXPERIMENT 15.—Large, brown and white bitch. Operation March 3, 1887. Circular resection and circular suture. One complete row of plain-quilt, postsection stitches. Glass clamps. Irrigation with 1:12,000 corrosive sublimate solution.

March 14. Dog has made an uninterrupted recovery. Given to the janitor for a pet.

June 1. Dog perfectly well.

Although there were but fifteen experiments in this group, they include eighteen circular sutures of the intestine, all of which were successful. In three instances, about one foot of intestine was reversed, and a double circular suture required. Furthermore, the making of two circular sutures at one time, particularly when accompanied with reversal of a portion of the intestine, increases more than twofold the danger to the animal operated upon.

But what chiefly distinguishes these results, is the *absence of adhesions*. In five of the experiments (2, 7, 8, 11, and 12) there were absolutely no adhesions; nor were there any such in Experiments 6 and 13, save the slight ones between the omentum and the face of the line of the suture. In only one instance were the intestines matted together as described by Rydygier and other surgeons, and as seen by me in so many of my earlier experiments. They who have attempted double circular resection and double circular suture can best appreciate the magnitude of the operation of reversing a portion of the intestine, and can understand, perhaps, my great faith in the suture which has given such results. Experiments 8, 9, and 10 were performed without clamps, without antiseptics—except for the silk, which had been prepared in the usual way—and without especial attention to cleanliness, save that the intestinal wound was diligently washed with a warm salt solution while the stitches were being tied. It may be asked why adhesions should be so strongly objected to. Not so much to the adhesions as such is it objected—although we have seen and already called attention to the fatal consequences of the obstruction which may attend them—as to the imperfect technique which constantly admits of the matting together of the intestines.

Adhesions of this nature imply inflammation; and an inflammation of an extent which, though it may not usually prove disastrous, is always more or less dangerous.   The less extensive the inflammation, the greater the certainty that the suture will hold.   It cannot, fairly, be urged that time may have swept away the adhesions in my cases, for the autopsies, at which no adhesions at all were found, were made two (Experiment 2), six (Experiment 7), eleven (Experiment 8), twenty-five (Experiment 11), and thirty-six (Experiment 12) days after the operations.

It is believed that the method of operation adopted in the experiments of Group II. combats more satisfactorily than any hitherto suggested the dangers which naturally attend suture of the intestine.   The great danger to be apprehended is, as already mentioned, the development of suppurative peritonitis as the result of the operation.

Let us consider for a moment the various factors which during or after the operation of intestinal suture may lead directly or indirectly to the production of purulent peritonitis.   In judging of the efficacy of the factors we are guided by the results of the experiments mentioned in the beginning of this article.

In the first place, whence may the pyogenic substances come which are essential to the production of suppurative peritonitis?   Evidently either from outside of the body through the wound in the abdominal wall or from the intestine through the wound in its coats.   There is, of course, no especial danger of infection of the peritoneal cavity from the exterior in the performance of enterorrhaphy, as compared with other operations requiring laparotomy.   This is not a danger, therefore, which needs any especial consideration in this connection or which is to be regarded as serious.

The chief danger of infection of the peritoneal cavity is manifestly from the contents of the intestine, in case they find their way through the wound in the intestine or along the lines of suture.   There is a possibility of the escape of intestinal contents at the time of the operation, but this is a danger which can be readily guarded against and one which is much less likely to be attended by serious results than the escape of intestinal contents into the peritoneum subsequent to the operation.   Probably too much importance has been attached to the use of antiseptic solutions for irrigation in intestinal resection (*vide* Experiments 8, 9, 10, and 13).

Although in performing enterorrhaphy on the human being I should be unwilling to discard what seems undoubtedly to be an additional precaution, I should, in the light of my experiments, and of several of my operations, hesitate to employ solutions as strong as those commonly advised.

We are brought, therefore, to the conclusion that the chief danger of infection of the peritoneum is from the passage of the intestinal contents

(bacteria) into the peritoneal cavity *subsequent* to the operation. The conditions which may lead to this unfortunate occurrence are 1, failure to close completely and firmly the wound of the intestine; 2, penetration of the intestinal lumen by one or more sutures; 3, giving way of the sutures; 4, ulceration or sloughing of the intestine at the site of suture.

In order to bring about complete and firm closure of the abnormal opening into the intestine it has been customary to make several series of sutures of the intestine one over the other in the form of the so-called "Étagennaht." In this way a considerable extent of the intestinal wall is folded in, the circulation of which is greatly impeded. There are especial dangers which attend the folding in of an unnecessarily large amount of intestinal wall, for, on the one hand, this increases the extent of tissue which undergoes sloughing and thus increases the danger of infection, and, on the other hand, the flange formed by the folds projecting into the intestinal lumen is an obstacle to the passage downward of the feces, which, accumulating at and above the site of suture, increase the tension upon the sutures and endanger their separation.

Experiments will subsequently be described which show that these dangers are not imaginary but real. A sufficiently firm closure of the wound in the intestine with much less danger from the sources mentioned is accomplished by the method adopted in the experiments of Group II., and which will be described subsequently.

Although experiments have already been cited which show the possibility of recovery even when stitches in the final row of sutures have penetrated the lumen of the intestine, nevertheless, it is plain that this penetration of the intestinal lumen is an accident which may lead to serious consequences, and it is to be carefully avoided. While it has been the aim of previous operators to avoid this accident, no definite rules have been laid down by which this is to be accomplished. I wish, therefore, in this connection to lay especial emphasis upon the importance of appreciating, as can be done in the manner already described, the moment when the point of the needle comes into contact with the submucous coat of the intestine. By observing this, it is within our power so to guide the needle that, while including a bit of submucous tissue, it does not penetrate the mucous coat.

Of no less importance in guarding against the third danger of peritoneal infection from intestineal contents, is care that each stitch in the final row shall include a bit of submucous tissue. Utterly misleading is the usual direction, that the stitches shall include only serous membrane, or even serous membrane and muscular coat. Experiment A was given precedence in the list of the experiments described in this article, in order to give prominence to the fallacious character of this direction. Any one, by a simple experiment, can convince himself how frail is the hold of sutures which include only serosa and muscularis. I am inclined

to regard perforation of the gut-wall, on the one hand, and the tearing out of stitches, on the other, as the leading factors in the production of the peritonitis which has brought about the fatal issue in many cases of intestinal suture.

The occurrence of ulceration or necrosis of the intestinal wall at the seat of suture, is a danger which is twofold in its action. It renders possible the escape of intestinal contents, and it affords a soil suitable for the lodgement and .growth of bacteria. How important is the latter factor, has been made apparent by the experiments of Grawitz previously cited. Especial dangers attend necrosis of the serous and subjacent coats of the intestine, even when the necrosis does not extend to the mucous membrane; for, doubtless, intestinal bacteria which, otherwise would prove harmless, may reach the diseased tissue and find suitable conditions for their development.

We must not forget that the predisposition to infectious inflammation is necessarily always present in circular suture of the intestine, and lies in the interference with the circulation which the suture causes, but it should be our aim to reduce this predisposition to a minimum. The circular suture disturbs the circulation both directly and indirectly: directly, in so far as the stitches produce constriction of the tissues which they include; and indirectly, in that it bends a portion of the intestinal wall at right angles to its original long axis. To these causes of disturbance of the circulation is to be added the pressure from above of the contents of the intestine upon the flange which is projected into the lumen in the form of the involuted intestinal wall. I am inclined to believe that this projecting flange acts, perhaps, less as a cause of intestinal obstruction than as a factor predisposing to the formation of adhesions, which, to the best of my knowledge, have seldom been absent in the obstruction cases. It has seemed to me that these adhesions have been particularly luxuriant when too much tissue has been turned in by the circular suture.

The results which were obtained in the series of experiments constituting Group II., furnish a sufficient answer to the plea that it is desirable to turn in over a large extent the edges of the intestinal wound, in order to bring as much of the peritoneal surfaces as possible into contact. As has been shown, a sufficiently extensive adaptation of peritoneal surfaces to each other can be accomplished without inverting an excessive amount of intestine, and thus with less impairment of the vitality of the intestine, and consequently less predisposition to peritonitis.

If the turning in of tissue predisposes to too extensive inflammation, perhaps the greatest danger of turning in too much is not that the flap may play the part of a stricture, but that the circulation at the site of the suture may be so much interfered with that union will not take place.

Experiments G and H were made partly to determine if this were so,

and partly to assist in establishing my belief that one could not, with safety, invert as much tissue in small as in large dogs.

EXPERIMENT G.—Very small brown bitch. Operation March 5, 1887. To employ two rows of quilt stitches in suturing the intestine of a very small animal.

March 9. Died. *Autopsy:* Gangrene of inverted edges. No union.

EXPERIMENT H.—Very small, black and tan terrier bitch. Operation March 7, 1887. To employ two rows of quilt stitches in suturing the intestine of a very small animal. Intestine so small that, after the second row of stitches was tied, the gut at the site of the suture looked quite white, especially along the convex border.

March 11. Dog not well. Killed. *Autopsy:* Gangrene of flap, as expected. Purulent peritonitis.

If two rows of stitches are so dangerous in very small dogs, why use presection stitches even in large dogs?

This question leads us to the consideration of the technique.

TECHNIQUE.—When the gut has been completely divided there ensues, immediately, a spasm of the circular muscle fibres nearest the cut edges, which inverts the mucous membrane, and almost closes the newly made intestinal orifices. The spasm of these fibres lasts but a few seconds: it is succeeded by a relaxation of the same, and by a contraction of the adjacent circular fibres; and now the mucous membrane is rolled out. It is exceedingly troublesome to take the stitches properly when the mucous membrane is thus everted. To relieve myself of this annoyance, I devised and tested various presection stitches, and, finally, adopted the one represented in Fig. 2.

FIG. 2.
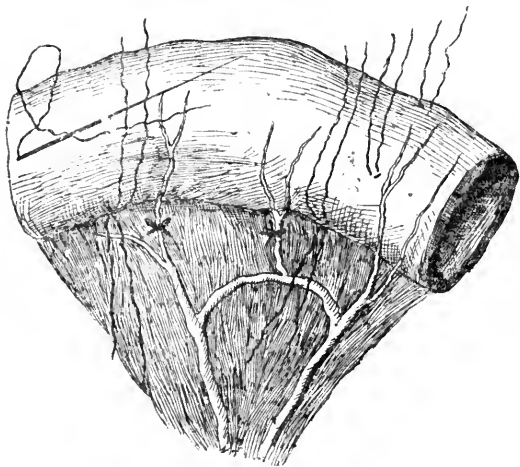
Presection, buried-knot quilt half-stitches.

To distinguish it from the other forms of quilt stitch, I have called it the buried-knot quilt stitch.

The four threads, two from each side, are tied at one time, and the knot becomes buried in the folds which have been raised up thereby.

From five to seven presection stitches—ten to fourteen half-stitches—are taken; two of these are at the mesenteric border, one on each side, and just at the attachment of the mesentery.   The needle is introduced on a line with one of the radii (*vide* Fig. 1, *a*) of a transverse section of the intestine, and pressed upon gently by the pulp of one finger until the resistance offered by the submucosa is encountered; it is then tilted (*vide* Fig. 1, *b*) through ninety degrees, or until about parallel with the long axis of the gut, pressed on with a little more force than before, tilted still further, and, finally, passed out.   It is reintroduced almost, but not precisely, where it emerged (*vide* Fig. 2), passed through in the same manner as before, but in the opposite direction, and its thread divided.   The threads of the half-stitches from both sides, when straightened out, naturally cross each other, and lie upon the portion of intestine to be resected. There is an opportunity for the exercise of some discretion in the selection of a spot on the mesenteric border for the introduction of the first stitch.   The vessels distributed to the intestine are ensheathed in more or less fat, usually in enough to make the mesenteric border obscure except at certain places between vessels which are rather far apart These places are often entirely free from fat and, if the mesentery be not pulled upon, are concave.

Fɪɢ 3..
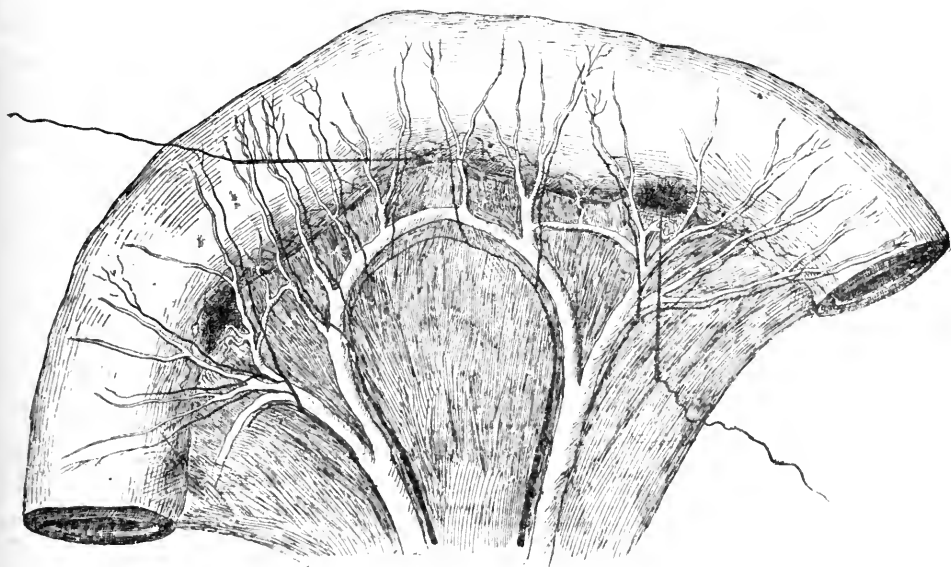
Introduction of needle into concavity, free from fat, in taking the first presection stitch.

At the bottom of any one of these little concavities (*vide* Fig. 3) the needle can be introduced with greater precision than it could be at a point where fat obscures the mesenteric border.   The first presection stitch (half-stitch), so taken, can be seen through the mesentery, and

serves as a guide for the taking of the corresponding stitch (half-stitch) on the other side.

I sew with what are called milliner's needles. These needles differ from the ordinary cambric needles, only in that they are disproportionately long, and, hence, easier to handle. Nos. 9 and 10 are good sizes for the purpose. Finer sizes cannot be threaded easily. Black silk is preferable to white because it contrasts more strongly with the parts to be sewed. The silk was prepared by soaking it—on the spool—in a solution of corrosive sublimate, 1 : 1000.

When all the presection stitches have been introduced, the vessels of the part to be resected are ligated (*vide* Fig. 2, ×) by circumvection with one of the threaded milliner's needles. Then the intestine is divided as close as possible to the presection stitches (*vide* Fig. 4). It is better to

FIG. 4.
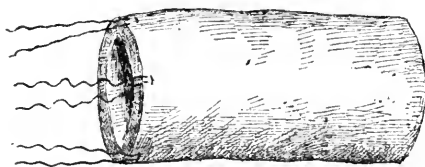
Intestine divided close to presection, buried-knot half stitches.

make a circular division of the wall of the intestine than to cut through both walls at once. By cutting rather rapidly one can take advantage of the first muscular contraction, and can complete this part of the operation before eversion of the mucous membrane has taken place. The presection stitches being tied, the eversion of the mucous membrane is prevented and the way prepared for the application of the complete row of what may be called *plain*-quilt stitches (*vide* Fig. 5).

FIG. 5.
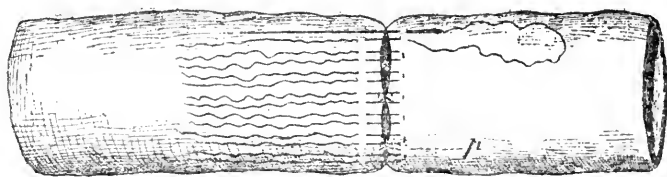
Presection, buried-knot stitches tied ; plain-quilt, post-section stitches introduced.

The plain-quilt stitches include, like the presection stitches, threads of the submucosa, and should be placed a little nearer to the cut edges than Figs. 5 and 6 would lead us to suppose. They should all be applied before a single one is tied. It is impossible to preserve a straight line of application if each stitch be tied as it is taken—the tendency being to depart, in an outward direction, more and more from the

straight line.   The distance from each other at which the stitches should be taken cannot be given at once for all of them—so much depends upon the spasm of the circular muscle fibres along the line of, and caused by the taking of the stitches.   The contraction does not, as a rule, supervene until several stitches have been taken; but, once set up, it extends in a circle in advance of the stitches, and must be taken into consideration in the application of them.   Before the last stitches have been applied the muscular tissue concerned is, frequently, no longer able to respond to the stimulus of stitch-taking, and the intestine assumes its natural size.   During the period of muscular contraction the stitches must be applied very close to one another—perhaps one to one and one-half millimetres apart—but before and after this contraction an interval of two to two and one-half millimetres may be left between them.   The wall of the gut rolls in of itself as the stitches are tied (*vide* Fig. 6),

Fig. 6.
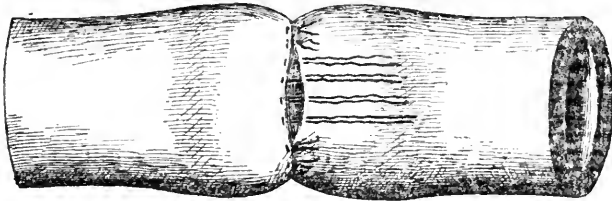
Intestine after all but four of the plain-quilt stitches have been tied.

and the entire operation can be conveniently performed without an assistant.   The threads must not be drawn so tightly in tying as to make the tissue included in the stitch look very anæmic.

In five of my operations (Experiments, 11, 12, 13, 14, 15, Group II.) the incomplete row of presection stitches was not employed; and, although the results justify the belief that it may with safety be omitted, the operation is so greatly facilitated by its use that I should be sorry, without good reason, to discard it.

In no instance was a triangular piece of mesentery exsected; nor did I ever sew together the edges of the rent which was always made in the mesentery, for fear of including vessels which might contribute to the blood supply of the sutured parts.

IRRIGATION.—The fluid used for irrigation, if neither too strong nor too hot, seemed to have little or no influence upon the results.   A solution of corrosive sublimate—1 : 20,000—was the one commonly employed, and I should prefer a weaker (1 : 30,000 to 1 : 40,000) solution to a stronger.

We had the opportunity, repeatedly, to observe the immediate bad effects on the intestine of solutions hotter than 38° Centigrade; and ultimately I became partial to cold or slightly tepid solutions for irrigation,

because, with the use of them, the wall of the intestine did not become so much swollen, and the stitches could, therefore, be applied with greater precision.

I was always especially careful to have the wound freely irrigated during the tying of each knot, and thus precluded the possibility of imprisoning foreign matter between the opposed peritoneal surfaces.

CLAMPS.—The intestine was usually clamped with glass microscopical slides of the English pattern; first made to embrace the gut, they were then tied together about their middle by a disinfected string; lastly, a short piece of rubber-tubing was introduced, on the stretch, between the converging ends of the slides; and, by slipping the tubing toward or away from the string, the pressure exercised by the clamp could be diminished or increased. Aside from its simplicity and the readiness with which it can be applied, the clamp has, in addition, this in its favor, that through its glass blades the state of the circulation in the intestinal wall may be watched.

ABDOMINAL WOUND.—The incision was always, save once, made in the linea alba, and as near to the pubes as practicable. If it was carried too far in the direction of the xiphoid cartilage, we were annoyed by the protrusion of a fatty flap covered by peritoneum, which seemed to spring from the posterior surface of the lower piece of the sternum and from the upper part of the inner surface of the anterior abdominal wall.

Before cutting through the peritoneum we covered the dog with two large disinfected towels (a procedure suggested by Dr. Mall), and stitched them to the edges of the abdominal wound and, above and below it, to each other.

The abdominal wound was closed usually with two rows of sutures. The first row, made with interrupted stitches of silkworm gut, included everything but the skin. The cut edges of skin were then brought loosely together by a continuous suture taken from its under surface and from the underlying loose connective tissue. The wounds were dressed with horsehair taken from a corrosive sublimate solution, 1 : 1000, and were bandaged with crinoline.

PREPARATION AND CARE OF THE DOGS.—Only one of the dogs operated upon (Exp. 3, Group II.) was dieted before the operation, or isolated after it. The dogs were frequently fed on the day of the operation, and were always allowed to run about, all together in a large room, as soon after it as they might be inclined. Milk was given to them as soon as they would take it, but solid food was withheld for about one week.

ANÆSTHETICS.—Morphine, hypodermatically (zi-ziv of a five per cent., solution), followed by a few inhalations of ether.

Neither Neuber's intestinal tubes nor any other similar contrivances

were made use of to simplify the performance of circular suture of the intestine ; because, 1, they were not believed to be necessary ; and 2, it was thought that they would increase the danger of the operation.

The employment of an incomplete row of buried-knot presection stitches facilitates the application of the subsequent complete row quite as much as does the use of the Neuber's tube. Furthermore, when a Neuber's tube is used, an incomplete row of post-section stitches must be taken ; and, as we have repeatedly said, the application of first row *postsection* stitches is troublesome, whereas it is easy to apply presection stitches.

I believe that when the circular suture is made over a tube of any kind the circulation in the immediate neighborhood of and along the line of suture is additionally obstructed. And should the tube slip to the slightest extent out of place, or soften too quickly, the circular intestinal wound may leak ; for I have repeatedly observed that a suture which answered the purpose over a tube failed to close the wound sufficiently when the tube was removed.

THE PREPARATION AND PRESERVATION OF THE NEEDLES.—Madelung and other surgeons have called attention to the fact that, in order to save time at the operation, it is well to have the needles threaded beforehand, and hence, to have a method of protecting the disinfected, threaded needles permanently from rusting. Madelung suggests keeping them in alcohol. I have tried, among other fluids, glycerine and alcohol, and found both of them too hygroscopic for the purpose. The difficulties seem to be most readily met by the adoption of an antiseptic oil. I have used with satisfaction the oil of juniper berries. It is, furthermore, necessary to have a means of supporting the needles in the oil, and above the water with which the oil is, from the picking up of the needles with wet fingers or wet forceps, sooner or later, certain to become contaminated. It is not enough to place the needles on a wire-netting supported in the oil ; for drops of water will surely be sustained at the points where the needles cross each other, and where they cross the wires, and at the points where the wires interlace.

Until we know of a better method of preserving the needles for immediate use, I would suggest the following one : Thread the needles with dry silk. Tie the silk with one knot in the eye of the needle. Bend to a little more than a half cylinder an oblong piece of very fine brass wire-netting on its long axis, and thrust the points of the threaded needles through the netting along the line of its greatest convexity. When a needle has been passed almost through the netting wind its thread about the half cylinder and tie the ends of the thread together near the eye of the needle. When all the needles have been introduced, and their threads wound and tied, place the wire-netting thus armed in

a cylindrical jar filled with the oil of juniper berries. Use the lowest needles first.

It certainly would be a great gain to the technique if such presection *half*-stitches could be devised, that one complete row of them on each side of the portion of intestine to be resected would suffice for the circular suture. I say *half*-stitches because, though the application of *complete* presection stitches (*vide* Fig. 7) is easy, it is rather annoying to

Fig. 7.
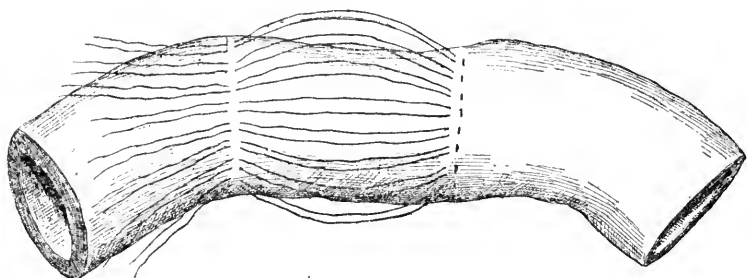
Plain-quilt, presection stitches introduced.

resect under them and to arrange them for tying (*vide* Experiments 11, 14, and 15, Group II.).

I have tried to perform circular suture of the intestine with presection *half*-stitches—one complete row of them on each side of the portion of intestine to be resected (*vide* Groups III. and IV.)—and, thus far, with unsatisfactory results.

GROUP III. ONE COMPLETE ROW OF BURIED-KNOT, PRESECTION SUBMUCOSA SUTURES.

(For buried-knot stitches, *vide* Fig. 2, p. 452, and Fig. 5, p. 454.)

EXPERIMENT 1.—Small, black dog. Operation February 2, 1887. To make single circular suture with one complete row of presection, buried-knot stitches. The operation lasted three-quarters of an hour from the first cut into the abdominal wall until the application of the dressing. Irrigation with solution of corrosive sublimate of uncertain strength.

February 3. Dog evidently not feeling well.

5th. Found dead. *Autopsy:* No signs of inflammation in the peritoneal cavity; not even at the site of the suture. Positive evidences of corrosive sublimate irritation (*vide* Experiment 2, Group II. Autopsy).

EXPERIMENT 2.—Small skye-terrier. Operation February 2, 1887. To make a single circular suture with one row of buried-knot, presection stitches. The operation for circular suture lasted thirty-five minutes. Irrigation with the same strong corrosive sublimate solution as in the preceding case.

February 3. Dog found dead. *Autopsy:* Subperitoneal vascular injection and hemorrhagic extravasations. Blood-tinged fluid in the peritoneal cavity, etc. The circular suture is firm; holds water injected with sufficient force to distend the intestine. Death from too strong an irrigation fluid.

EXPERIMENT 3 —Rather small skye-terrier. Operated February 3, 1887. Same suture as in foregoing cases. Operation performed in thirty-four minutes.

February 8. Dog is dying. Killed. *Autopsy:* Purulent peritonitis, starting from the circular suture.

EXPERIMENT 4.—Small fox-terrier. Operation February 4, 1887. Same suture as in foregoing experiments of this group. Irrigation with solution of corrosive sublimate, 1 : 10,000.

February 8. Dog is dying. Killed. *Autopsy:* Purulent peritonitis, starting from line of circular suture.

EXPERIMENT 5.—Medium-sized, fox-terrier bitch. Operation February 7, 1887. Same suture as in foregoing experiments of this group. Irrigation with ordinary cold water.

February 21. Dog is failing. Killed. *Autopsy:* Intestines badly matted together by adhesions. Circumscribed abscess cavity surrounding, almost completely, the circular suture, which latter appeared to be firmly healed.

EXPERIMENT 6.—Medium-sized, jet-black bitch. Operation January 27, 1887. To reverse a portion of the intestine. Double circular suture. Presection buried-knot stitches. Operation lasted one and three-quarters hours.

January 29. Dog died. *Autopsy:* Purulent peritonitis.

EXPERIMENT 7.—Medium-sized dog. Operation February 4, 1887. To reverse portion of intestine. Operation the same as in Example 6.

February 9. A.M., suddenly taken sick. P.M., died. *Autopsy:* Peritonitis. Abdomen distended with sero-purulent fluid.

GROUP IV. EMMERT'S STITCHES.

In the experiments of this group such presection stitches were applied as are represented in Fig. 8.

FIG. 8.
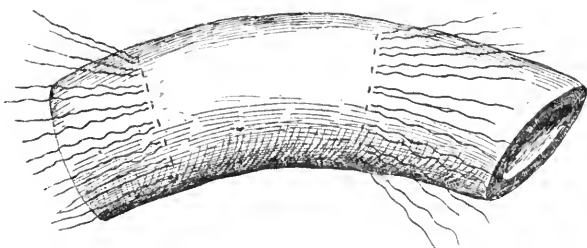
Emmert's stitches.

The idea of making such stitches I believed to be original with me, until I ascertained that I had been anticipated in the conception of them by Emmert,[1] who, however, had employed them only to sew up linear wounds of the intestine, and not for the circular suture.

EXPERIMENT 1.—Operation January 20, 1887. Single circular suture by one complete row of Emmert's stitches.

January 21. Dog, evidently, has peritonitis.

22d. Found dead. *Autopsy:* Suture had given away. Suppurative peritonitis.

EXPERIMENT 2.—Large, pointer dog. Operation February 9, 1887. The same suture as in Experiment 1.

February 11. Dog found dead. *Autopsy:* Purulent peritonitis starting from the circular suture.

EXPERIMENT 3.—Small, black-and-tan dog. Operation February 11, 1887. Single circular suture (Emmert's stitches) as in Experiments 1 and 2.

February 12. Dog died. *Autopsy:* Purulent peritonitis starting from the circular suture.

[1] Emmert : Pitha und Billroth's Handb. d. Chirurgie, Absch. vii. p. 209.

I shall not record the rest of my experiments on circular suture of the intestine, because most of them seem, now, rather absurd to me, and none of them admit of classification.

Summary.

1. It is impossible to suture the serosa alone, as advised by authors.

2. It is impossible to suture unfailingly the serosa and muscularis alone, unless one is familiar with the resistance offered to the point of the needle by the coats of the intestine. Furthermore, stitches which include nothing but these two coats tear out easily, and are, therefore, not to be trusted.

3. Each stitch should include a bit of the submucosa. A thread of this coat is much stronger than a shred of the entire thickness of the serosa and muscularis. It is not difficult to familiarize one's self with the resistance furnished by the submucosa, and it is quite as easy to include a bit of this coat in each stitch as to suture the serosa and muscularis alone.

4. It is unnecessary in performing circular suture of the intestine to make more than one complete row of stitches if they be of the plain-quilt variety. Unless all of the stitches of the row are applied before a single one is tied, it is impossible to preserve a straight line in the application of them.

5. It facilitates the operation very much to make five or six presection sutures; for the eversion of the mucous membrane, which otherwise takes place and makes the application of first-row, postsection stitches troublesome, is thus prevented. The first presection stitches should be introduced at the mesenteric border of the intestine, and at a place as free from fat as possible.

6. The plain-quilt stitches are to be preferred to the ordinary Lembert's stitches (Knopfnähte) because, 1, one row of them (the former) is sufficient for the circular suture; 2, the knots of the first row of Lembert's stitches prevent the most accurate apposition of the opposed peritoneal surfaces; 3, the plain-quilt stitches constrict the tissues less than the Lembert's stitches; and, 4, the former tear out less easily than the latter. Madelung's cartilage-plates, which he employs partly to prevent the tearing out of the stitches, are unnecessary when a bit of the submucosa is taken up with each stitch.

7. The vessels of the excised intestine should be ligated by circumvection ("Umstechung"). It is not necessary to exsect a triangular piece of mesentery; and it is unadvisable to sew together the edges of the rent in the mesentery, for, in so doing, one might include small vessels which contribute to the blood-supply of the sutured parts.

8. Solutions of corrosive sublimate stronger than 1:20,000 should

not be used for irrigation. It would be better, perhaps, to employ weaker solutions (1:30,000 or 1:40,000). The irrigation should be attended to most diligently when the stitches are being tied.

PRIMARY MALIGNANT. DEGENERATION OF THE KIDNEY IN INFANCY.[1]

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PRIMARY malignant degeneration of the kidney is most frequently met with at the two extremes of life, infancy and old age. It is to the study of it as it appears in the first period that attention is invited.

Although this. is comparatively a rare affection, yet one hundred and forty-four cases have been collected, and without doubt a more diligent search and better facilities than are afforded by the libraries of this city would reveal many more. As the disease has quite a typical course and array of symptoms, it can best be described by the detailed history of a case.

CASE I.—Wm. P., three years old, was first seen by me July 6, 1886. He was, at that time, an extremely emaciated child with an anxious expression, not so much indicating pain, as it did the presence of some serious constitutional condition ; it was, in short, a very decided cachexia. Beneath his thin pinched face and flat thorax a remarkably prominent abdomen at once attracted attention.

The parents gave the following history : The child had always enjoyed good health. In the early spring he seemed to tire easily, and was generally seen to sit quietly by and not take much part in the play of the other children. This continued until late in April, when he had frequent and persistent turns of vomiting, which continued for a week or more, and resisted all the efforts to allay them. Early in May a hard swelling was accidentally felt in the left side. About this time he began to loose flesh and appetite and to have restless nights, and since this time his condition had grown rapidly and steadily worse. His appetite was gone, his extremities were reduced to mere skin and bones, and the tumor in the abdomen was growing rapidly. This increase in size had not been accompanied by any symptoms except an occasional turn of diarrhœa or a recurrence of the vomiting.

The family history was good, except that the paternal grandfather

had had a cancer successfully removed from his lip in Freiburg, a few months previously.

Physical examination revealed a smooth round tumor, occupying the left half of the abdomen, and giving an indistinct feeling of fluctuation. The subcutaneous abdominal veins were greatly enlarged, as were those of the right thigh. Dulness on percussion extended from the ribs to the crest of the ilium, and from the median line of the back to the umbilicus. The greatest measurement around the abdomen was twenty-four inches. The patient was put under the influence of an anæsthetic, when a loop of intestine, which seemed to be the colon, was discerned passing across the surface of the tumor from the left side above and without downward and inward toward the right half of the pelvis. Three or four deep punctures were made into the tumor with a large needle, through which several ounces of a thick fluid, of a dark red color, were aspirated. But it was not possible to reduce the size of the tumor by aspiration. This fluid did not coagulate, and the microscope revealed the presence in it of a large number of red and white corpuscles, large proliferating cells, and a few poorly defined crystals.

The diagnosis was now made of a malignant degeneration of the kidney, probably sarcomatous in nature. This was based upon the following grounds: The tumor had begun above and had not come up from the pelvis, consequently it was in some organ either in or behind the abdominal cavity. An echinococcus cyst was excluded by the results of the aspiration, as was also a congenital cyst of the peritoneum. A leucocythæmic spleen was excluded, as there was not a general enlargement of the lymphatic glands, only a few small ones could be detected in the axilla of the right side. There was no history of chronic malarial poisoning, nor of any long-continued suppuration, which might have produced on the one hand, an ague cake, and on the other an amyloid spleen. Malignant degeneration of the spleen in infancy is practically unknown, as is also that of the pancreas. But the fact that a loop of intestine was found fixed upon the anterior surface of the tumor indicated very clearly that it was a retroperitoneal growth, and, therefore, either from the retroperitoneal glands or kidney. As the glands do not, when enlarged, cause a uniform tumor with a smooth surface, the kidney was clearly indicated as the seat of the affection.

Pyonephrosis does not give rise to tumors of this size, especially in infancy, and the characteristic changes in the urine were absent. Tubercular degeneration of the kidney was excluded for much the same reason, and because no other symptoms of tuberculosis existed. The results of the aspiration excluded hydronephrosis, and also a fibrocystic degeneration of the kidney. Cystic degeneration of the kidney is not uncommon in utero, which condition is usually bilateral, but after this period it is seldom met with until middle life.

The diagnosis was therefore made of a malignant degeneration of the kidney with fatal prognosis. The child had no fever after the aspiration and no pain, except such as was due to the presence of the tumor. Three days later, however, the waist measure had increased to twenty-five inches.

Careful and repeated examinations of the urine revealed nothing abnormal, except that the quantity was small and the specific gravity correspondingly high.

July 22d the abdomen measured twenty-six inches in circumference.

On the 26th the breathing, which had always been shallow and rather rapid, was observed to be much accelerated and very difficult. The patient had been coughing a great deal during the night and the lungs were found to contain numerous coarse mucous râles, especially in the lower lobes. It is a question whether or not the metastatic growths, found upon the post-mortem table, in the pleural cavities could have caused this catarrh. At the time it was supposed to be due to œdema, as there was more or less pleural œdema present.

For some time he was propped up in his baby carriage with pillows, where he remained day and night except when occasionally placed in an easy chair. At all times, however, he retained the upright position on account of the dyspnœa, which became very distressing if he relinquished it for a moment. He drank milk with apparent relish, but took little or no solid food.

All this time he had had no fever, but on the 3d of August his temperature rose to 100° F., in the afternoon. This slight fever disappeared again in a few days. The œdema had grown so marked that his eyes were partially closed by it. His respirations, however, numbered only thirty-two to the minute and there were not so many râles in the lungs.

The orthopnœa and dyspnœa remained unchanged. The size of the tumor gradually increased until the abdomen measured twenty-nine inches in circumference. Large tortuous veins passed up over Poupart's ligaments and spread out over the abdominal wall. The eyes were almost closed by the puffy lids, and the legs were swollen and tense as high as the knees. Bandages had been worn upon the legs for some time to sustain the skin. The tumor gradually enlarged until it had passed beyond the median line. Its edge was distinct, although rounded off. The colon could often be seen distended with gas, forming a marked prominence across the tumor. Its position never changed, and when it was not distended it could always be felt as a prominent band passing over the front of the tumor. During the last weeks diarrhœa had been almost constant. His strength failed until he was scarcely able to lift a small cup of milk to his lips. His entire attention was concentrated upon securing a sufficient supply of air, as the upward pressure from the abdominal cavity had apparently left but little available lung space. His death, on September 8th, was easy and due to exhaustion.

The post-mortem examination was made, with the assistance of Dr. R. W. Stewart, three hours after death.

Thorax. Right lung: Free from adhesions, tissue normal at the base; resting upon the diaphragm and adherent to the visceral pleura were two kidney-shaped bodies about the size of pigeon's eggs, of brain-like consistency and a uniform brownish color upon section. Left lung: Free from adhesions. Contained a small, hard, yellowish nodule in the lower lobe, slightly emphysematous at margins. At the base of the lung there were growths similar to those on the right side, but adherent to the parietal layer of the pleura. Heart empty and normal.

Abdomen. Contained about three ounces of yellowish clear fluid. A tumor extending from one and a half inches below the xiphoid cartilage to the pubes appeared in the incision, and was crossed by the descending colon, the latter running diagonally in the direction from the left nipple to the right iliac fossa, in which fossa the sigmoid flexure rested, passing thence across the base of the tumor to the rectum. The meso-colon separated in both directions over the tumor and was adherent to it, but could be stripped off; the transverse meso-colon was also adherent in the upper

portion to a slight extent. Upon the right side the hand could be passed around the tumor to the vertebral column without encountering resistance; upon the left side a few soft adhesions existed between the surface of the tumor and the abdominal wall, but these were easily broken through, thus allowing the hand to pass from the left iliac fossa to the margin cf the ribs, but not external to the mammary line, this obstruction being caused by the attachment of the reflected peritoneum upon the abdominal wall. When this reflection of the peritoneum had been incised the hand passed quite readily through a loose connective tissue around the tumor to the vertebral column.

Upon the left side of the tumor, in the line between the nipple and iliac spine, were two hemorrhagic spots about the size of a quarter of a dollar. Over the entire surface of the tumor, wherever the peritoneal covering was removed, were numerous openings through which a cheesy material exuded. The tumor was larger than the largest head, and had the appearance of an immense brain with the dura mater covering it. Numerous large bloodvessels ran in all directions over the surface.

The tumor was tightly adherent to the pancreas on its under surface, and also to the diaphragm at its lower posterior segment upon the left side. In separating this last adhesion the diaphragm was broken through, giving exit to some serous fluid from the pleural cavity.

The tumor was easily shelled out from its peritoneal covering, but in doing so, a cyst situated in the upper part was ruptured and discharged a heavy, thick, caseous material. This cyst was about the size of a large goose egg and had no connection with other parts of the tumor.

Where the renal artery entered the tumor a thick pedicle was divided. The large veins from the surface all came together here. The renal artery was not larger than that of the right side. The tumor was evidently a degenerated left kidney of which no trace could be found.

The left ureter entered the posterior inferior portion of the tumor.

The small intestine and stomach were normal.

The right kidney was slightly hyperæmic.

The spleen was free from adhesions, although it had been pushed high up in the vault of the diaphragm by the tumor.

The pancreas was closely adherent to the upper surface of the tumor.

The liver was hyperæmic. It had been pushed downward and toward the right side, but was not adherent to the tumor.

The tumor weighed 3065 grammes, about 7 pounds. On section it presented the appearance of an enormously expanded kidney. The cortical portion, about an inch and a half thick, was honeycombed with blind pouches extending into it from a large central cavity. Some of these pouches were large enough to allow the insertion of a finger, others were much smaller. All of these central cavities were filled by a semi-solid, exceedingly offensive mass containing a large proportion of blood.

Drs. James French and R. W. Stewart kindly made microscopical examinations of the tumor, and reported that it was a round-celled sarcoma, containing remnants of the kidney structure. The metastatic growths from the thorax were typical examples of the round-celled sarcoma.

Dr. Stewart reported an apparent alveolar structure, which was due to large tubes or vessels filled with round cells.

The case just described is in many respects a typical one. The age of the patient, which was three years, corresponds exactly with the average age as given in one hundred and thirty cases.

Of these, twenty per cent. were under a year, twenty four per cent. between one and two years, seventeen per cent. between two and three years, twenty-one per cent. between three and four years: sixty per cent. of the cases thus occurring in the first three years of life, and over eighty per cent. in the first four years.

As is usually the case, the beginning of the disease was very insidious, and no exact time can be given. This is partly due, no doubt, to the fact that the inaccessible position of the kidney shields it from observation. I am strongly inclined to the belief that these tumors are always congenital, and that their growth may either begin during the intra-uterine period, or that they may remain dormant until, from some cause or other, they are stimulated into active development. That they may grow even before the birth of the child is shown by the cases reported by Jacobi, Paul, and Osler, in seven and eight month fœtuses. One case is recorded as having been eight years in developing in an eight year old child. In quite a number of cases the rapid growth dates from a trauma, to which the degeneration has been attributed by some authors. In these cases the dormant heterogeneous tissue has probably been stimulated by the trauma into activity. This theory of their congenital origin is supported by the tender age of the vast majority of patients, and by the observations and deductions of Cohnheim and Grawitz. Cohnheim's explanation of the presence of striped muscular fibres in a small percentage of these cases is, that owing to the close relationship in position of the first rudiments of the uro-genital organs to the proto-vertebræ, by faulty segmentation of the latter some of the germinal muscle-cells may become incorporated with the cells constituting the first rudiments of the kidneys, and that these germinal muscle-cells afterward develop into the pathological new growth. Grawitz has observed small collections of the tissue of the renal capsule incorporated in the kidney. He accounts for its presence in the same way that Cohnheim accounts for the muscular fibres—i. e., by a fault in the development. These small islands of tissue may remain in their abnormal position for years and apparently never develop, or after an indefinite period they may begin to grow, giving rise to cancerous tumors. Grawitz found small collections of cells resembling the tissue of the suprarenal capsule in the kidneys of adults where they had apparently remained dormant during the entire life of the individual, giving rise to no symptoms and no local disturbance. The duration of these cases, dating from the first symptoms, whether that be a tumor, hæmaturia, persistent vomiting or pain, is misleading, for, as stated above, they are all probably of congenital origin. The average duration of the sixty-two cases in which it is mentioned, is seven and a quarter months. The shortest time is six days and the longest eight years. Of the symptoms mentioned the tumor is more apt to be the first observed than any of the others. Seibert, who analyzed fifty cases in

his excellent article on hæmaturia in this disease, found that in thirty-six of these the tumor was the first symptom.

In the case just described the patient was a male, and the tumor was on the left side, while in the next case the patient, a female, had the tumor on the right side. These two cases are typical ones in regard to sex and position of the tumor, as in all the cases neither sex has any advantage over the other in immunity from the disease, nor can it be said that it is more likely to be found on one side of the body than the other.

Hæmaturia occurs in about fifty per cent. of all cases, but in a great many of these it comes on late in the course of the disease or after the tumor has been discovered. It is a symptom of the greatest importance in that small percentage of cases in which it is the first danger signal and by means of which an early diagnosis may sometimes be made. It was present in fifty per cent. of the cases in which the presence or absence of the hæmaturia was referred to in the reports. In those under one year of age hæmaturia was present in thirty-seven and a half per cent., while in those between one and five years it was observed in fifty-six per cent. If we take the total number of cases under one year and suppose that hæmaturia was absent in all cases in which no record is found, then it was present in but thirteen per cent. of the cases, while in those between two and five years, computed in the same manner, it was present in forty-four per cent. In either case the increase is very marked between the first year of life and the succeeding ones. In neither of the cases reported in this paper was it present at any time. Hæmaturia depending upon this condition is usually profuse in quantity. Rohrer describes three varieties of hæmaturia from cancerous kidneys, but his description is based, for the most part, upon observations of adults. The hemorrhage is either acute, accompanied by grave general symptoms if profuse in quantity, or is much less in quantity and takes place without causing any symptoms, or, lastly, the amount of blood lost is so small that it can only be detected by the microscope. It may recur frequently or may be observed but a few times in the entire course of the disease. Seibert reports a case in which it was the cause of death. In this case the hemorrhages had been excessive in quantity and very numerous. Seibert's classification of hæmaturia and its significance is as follows:

I. Hæmaturia occuring in apparently healthy children.
   a. Without pain previous to the occurrence.
   b. Preceded by pain.

The hæmaturia of nephrolithiasis must be excluded by chemical and microscopical examination and by the amount of hemorrhage. A very important factor is that this latter hemorrhage is always preceded and accompanied by pain, while if dependent upon malignant degeneration

the pain always ceases when the flow begins. That is supposed to be due to the fact that the blood retained in the pelvis by a coagulum in the ureter causes pressure-pain, which is relieved when the pressure becomes great enough to force the blood past the obstruction.

Hemorrhage from a tubercular kidney must also be excluded, but this is seldom present in children, and very rarely unless general tuberculosis exists.

II. Hæmaturia occurring in children in poor health without any apparent cause for the general condition.

This variety is rare because the tumor can usually be felt before it has existed long enough to make any marked inroad upon the child's health.

III. Hæmaturia occurring in children during or soon after an attack of any of the acute infectious diseases.

This variety may occur as the result of an acute inflammation in a healthy organ, but is then neither so profuse nor of as long duration as that from an organ which is the seat of malignant degeneration.

IV. Hæmaturia occurring in the course of chronic inflammation of the kidneys.

If the hemorrhage takes place without any symptom of an acute exacerbation of the chronic inflammation, cancer must be thought of, if renal calculus can be excluded.

Upon the post-mortem table metastatic deposits were found in the lung, and also attached to the pleura in the case just reported. Primary malignant growths in the kidney, as has been known for a long time, have little tendency to produce secondary deposits in other organs. They frequently attain great size, but are prone to remain within the strong capsule in which their development first began. This is as true of these tumors in infants as in adults, and truly marvellous examples of this peculiarity can be seen in the three largest tumors on record, two of which weighed thirty-one pounds each and one twenty-seven and a quarter pounds, and yet no secondary deposits were present in any of them. In fifty per cent. of the cases collected, in which death was due to the disease, no metastatic deposits were present. This is a fact worthy of the most careful consideration and which will be referred to again in discussing the permissibility of the removal of these tumors by operative measures. In the cases in which secondary deposits were found their seat was most frequently in the lungs or the liver, and with the next greatest frequency in the retroperitoneal and mesenteric glands.

These tumors show comparatively little tendency to produce secondary growths and even a more marked immunity from adhesions to the organs of the abdominal cavity. This is probably due to the fact that the tumor without regard to its size or the degenerations which it has undergone, remains within its capsule behind the peritoneum. As the

capsule is thick there is little direct irritation of the peritoneum covering it, and hence, not that very decided tendency to the production of adhesive inflammation which characterizes malignant tumors within the peritoneal cavity. The tumor is also usually very easily removed from within its capsule, as is noted in very many of the post-mortem records and as was found in both of the cases reported in this article.

The presence or absence of adhesions is found recorded in fifty-five cases. In fourteen of these the adhesions were to the colon only. As the tumor grows from directly behind the colon the mesocolon very soon becomes part of its covering, as the size of the tumor increases, and the colon is bound down and becomes adherent, by means of its mesocolon, to the surface of the tumor. This is, however, very readily loosened by an incision external to the colon and a little dissection with the end of the finger. Among these cases are the two largest on record, in which the tumors weighed thirty-one pounds each, and one of which had existed for eight years. In one of Abercrombie's cases, in which the existence of the tumor was known for three years, there were no adhesions whatsoever. In ten cases there were no adhesions and in four the record is that they were very slight. These three classes give a total of twenty-eight cases or fifty per cent. of all those in which this condition is noted. Of the cases in which adhesions were described we find them to the liver twelve times, to the colon eleven times, to the pancreas and small intestine each six times, to the stomach and duodenum each three times, to the diaphragm, vena cava, and omentum, each twice, and to the sigmoid flexure, cæcum, opposite kidney, vertebral column, renal glands, mesentery, spleen, aorta, portal vein, ligament hepato-renalis, and the ribs, in one case each.

The dimensions to which these tumors occasionally attain is marvellous when we consider the diminutive size of many of the patients, some of whom were not much larger than their tumors. The largest tumors of this class have been referred to above, weighing thirty-one pounds each; one in an infant of ten months weighed ten pounds. The smallest weighed but little more than the normal organ, and between the two extremes all gradations are present. The average of the seventy cases in which the weight is given, is about seven pounds. The sarcomatous kidney of infancy is, on the average, larger than that of adult life. The entire kidney is sometimes degenerated and nothing of its normal structure remains to identify it. In other cases the growth would seem to have started in the pelvis of the kidney, or in the glands found near the hilus, as in these cases the kidney tissue can be discovered lying on the surface of the tumor, which has apparently pressed it in front or to one side of it as it grew. The boy's case belongs to the first class, while the case about to be reported is a typical example of the second. In this case the kidney formed a slight prominence upon one

side of the solid round tumor. The tumors frequently have cysts in the interior, usually containing blood and broken-down tissue, although occasionally a clear, viscid, tenacious fluid is found.

The presence of these hemorrhagic cysts explains why the diagnosis of fungus hæmatodes and encephaloid is so frequently found, especially in cases reported years ago, when macroscopical diagnoses were more frequent than they are now, since the more exact anatomical pathological classification of to-day requires that a careful microscopical examination shall sustain the clinical and macroscopical diagnosis. For the same reason cancer and carcinoma are found in the older reports in a majority of the cases, while in the more recent ones some of the sarcoma group take their place. Smith, in his article on primary sarcoma of the kidney in *The American Journal of the Medical Sciences* for 1886, says, that, although scirrhus is often spoken of, it is rare as a renal growth. If this is true in general, it must be particularly so in the case of infants, for carcinoma is rare in infancy and childhood, and the kidney forms no exception to this rule. Let us examine the cases to see if this conclusion is supported by them; remembering that some of them date as far back as the fourth decade of this century, about the time that attention was first called to the occurrence of primary malignant degeneration of the kidney. We find a diagnosis given in 120 cases. In 23 of these the diagnosis is sarcoma, in 15 rhabdomyoma, in 14 round-celled sarcoma, in 5 spindle-celled sarcoma, in 5 medullary sarcoma, in 4 adeno sarcoma, in 3 a combination of spindle- and round-celled sarcoma, in 2 myxo-sarcoma, and in 1 sarcoma-carcinomatosus; giving a total in the sarcoma group of 76 cases, or 61 per cent. of all. In the carcinoma group there are, 4 carcinoma, 10 medullary carcinoma, and 1 carcinoma hæmatodes; a total of 15 cases, not quite 13 per cent. of all. In a third group of cases in which the diagnosis may be regarded as indefinite, there are 17 cases designated as encephaloid, 15 malignant and cancerous, and 3 fungus hæmatodes; a total of 35 cases. Some of these cases might be referred to the sarcomata and some to carcinomata, but that is impossible unless they could be reëxamined by a reliable pathologist, as was done by Eve, who examined a so-called medullary tumor from the kidney of an infant, which had been deposited in the museum of the Royal College of Surgeons, London, in Hunter's time, and discovered that it belonged to that rare group of tumors which have been variously designated as rhabdomyosarcoma or as myosarcoma striocellulare. More than half of these cases are, therefore, sarcomatous in character, and but an eighth of them carcinomatous. But a large proportion of these cases have been diagnosed upon evidently insufficient evidence as to their true nature and even before pathologists had actually defined the characteristics of the malignant growths as they are understood to-day. In latter years the carcinomatous kidneys of infants have been seldom re-

ported, and the proportionate number of sarcomatous tumors has greatly increased. But carcinoma does occur, and one case in point was reported by Dr. Rowe, of Cincinnati, in which the diagnosis was made by two accurate and reliable pathologists, Drs. Kebler and Mackenzie.

Twenty per cent. of the sarcomatous tumors have been found upon careful examination to contain a tissue entirely foreign to the kidney, namely, striped muscular fibres. As these tumors are for the most part spindle- and round-celled sarcomata containing striped muscular fibres and oftentimes inorganic muscular tissue, it is probable that a careful search would result in increasing the number of the rhabdomyosarcomata. The presence of the unstriped muscular tissue is not difficult to account for, as it normally exists in the kidney, and has been seen there by both Henle and Eberth, but it remained for Jardet, of Vichy, to describe its distribution. He found a system of muscular fibres springing from the pelvis and running parallel to the larger arteries and veins in the perivascular areolo-fibrous sheath of the vessels, but never constituting a complete sheath to any vessel and not extending far amongst the renal tubuli. This muscular tissue becomes hypertrophied in lithiasis, hydronephrosis, and all chronic inflammations. But while the inorganic muscular tissue is thus physiologically present, the striped muscular fibres are entirely heterogeneous. The most generally accepted explanation of its presence is Cohnheim's, which was given above. Paul describes an apparent development of striated fibres from the sarcomatous elements themselves, in the case of a seven months' fœtus examined by him. Birch-Hirschfeld speaks of the same thing. Such a development of spindle cells agrees with the observations of Zenker upon the regeneration of muscle in wounds, who described it as taking place from the spindle cells of the interstitial connective tissue. Waldeyer agrees with Zenker upon this point.

CASE II. was under the care of Dr. R. W. Stewart. The child, a little girl of German parentage, one year and eight months old, was large and well developed for her age. She had always seemed well and was unusually active. The marked prominence of the abdomen first attracted the mother's attention in April, 1886, and caused her to seek medical advice. Dr. Stewart saw her first early in July. A few days later a thorough examination of the case was made under an anæsthetic. The tumor was found on the right side and was firmly fixed in its position in the lumbar region. The fingers could be inserted between the upper edge of the tumor and the liver, and also between its lower border and the crest of the ileum. The tumor was of a regular ovoid shape with a smooth surface. The dulness was continuous upon both gentle and deep percussion from the tumor around to the median line of the back. Several punctures with the needle of the aspirator secured but a few drops of a thick, gelatinous, colorless fluid. There was, however, no sensation of deep fluctuation upon palpation. A fold of intestine, which was at the time regarded as the colon, was situated between the

tumor and the anterior abdominal wall. The diagnosis was a degeneration of the kidney, and the prognosis, therefore, necessarily fatal unless the tumor could be removed, to which the parents would not consent. Hæmaturia was not present at any time. An examination of the urine showed it to be acid, of a specific gavity of 1.020, and containing neither albumen nor sugar.

The growth of the tumor was very rapid, and in three months time it had increased so greatly that it began to interfere materially with respiration and sleep. The parents now saw that the child's condition was serious and wanted an operation performed. At this time the groove between the liver and tumor had about disappeared ; it had encroached upon the abdomen as far as the median line and extended down to the crest of the ileum. Every other organ in the body seemed to be perfectly healthy, and the tumor was simply beginning to interfere mechanically with the digestive and respiratory systems. Therefore, as a last resort, it was decided to operate, although the opinion of all who examined the case was that the chances had become decidedly against the child, and that three valuable months had been lost in waiting. Every preparation was made that could in any way have a favorable influence on the result.

On the afternoon of October 9th I removed the tumor through the anterior abdominal wall, being assisted in the operation by Drs. Stewart, Ransohoff, Christopher, Wilder, and Hendley. Langenbeck's incision was made because the tumor was too large and solid to have been extracted through any lumbar incision and because the abdominal incision was regarded as the safer, allowing, as it would, a thorough exploration of the relations of the tumor, and showing at once the existence of any dangerous or extensive adhesions. The incision was made of moderate length, but was immediately lengthened from the margin of the ribs almost to the crest of the ilium. The tumor presented, crossed from below upward by the ascending colon. No adhesions existed, and so the peritoneal covering of the tumor was incised and torn through external to the large intestine. As rapidly as possible the peritoneal covering, together with the mesocolon and colon, was dissected loose with the finger from the tumor. Although not very difficult to accomplish, it was rather a tedious dissection. Upon the lower segment of the tumor several large veins were ligated and divided in order to extend the incision in the peritoneum. Then the lateral attachment to the peritoneum and the loose ones, behind the line of reflection of the peritoneum from the tumor to the abdominal wall, and between this line and the vertebral column, were torn and dissected loose. The pedicle could now be readily reached. The tumor was drawn out through the incision, the pedicle clamped, ligated, and cut off.

There was no oozing whatsoever from the large surface from which the tumor had been removed, and, after cutting off the ligatures and dropping the pedicle, the abdominal wound was closed, the bandages applied, the child put to bed and surrounded with hot bottles. The operation had lasted an hour and a half, and the child had taken the anæsthetic very badly. Several times the ether had to be withdrawn as the respirations became bad or as the pulse grew weak, and twice it was necessary to give small hypodermatic injections of whiskey to stimulate the flagging heart. She vomited repeatedly after being returned to bed and became entirely conscious. The heart was, however, weak and

rapid, and would not respond to any stimulant. Two hours after the end of the operation the patient died of shock.

No post-mortem examination was obtained. The tumor was round, with a slight oval prominence on one side. Upon section it was of a uniform grayish white color, except the oval prominence on the side, which was evidently kidney tissue. Just between this kidney and the tumor proper were a few cysts the size of marbles. It was from one of these that the fluid obtained in the exploratory puncture had been drawn. The tumor weighed 830 grammes, about 2 pounds.

Drs. Stewart and Hendley made microscopical examinations of the tumor, and found that it was a spindle-celled sarcoma with bundles of connective tissue passing through it. The kidney itself was also sarcomatous, only an occasional glomerulus could be found, and the tubules were almost entirely obliterated.

Eminent authorities, both in America and Europe, have expressed the opinion that it is unjustifiable to remove degenerated kidneys in infants, but these same authorities for the most part advise the removal of sarcomatous kidneys in adults, their conclusion being based upon the statistics of the operation. A critical examination of the cases of this operation is, therefore, in place in order to determine whether or not their verdict should be final. In the first place we must remember that this is a comparatively young operation, so young that Rohrer's book, published but a decade ago and otherwise very complete, does not even allude to the possibility of operative interference. Also that but twenty-five cases have been operated upon, and many of these, as will be shown shortly, were undertaken long after the time for successful interference had passed.

It is only after the indications for an operation have been settled that the statistical study of it becomes valuable, and that it may be condemned or admitted to the ranks of justifiable operations upon its record as established on a scientific basis. Let us glance for a moment over some of the cases which have brought the operation into discredit. In one case death occurred upon the table from hemorrhage. It was an unpremeditated nephrectomy, as the diagnosis of a kidney tumor had not been made. The tumor was very large, weighing five pounds, and had encroached upon the walls of the vena cava, hence the unfortunate accident. Moreover, the tumor had existed for a year. In another case, of which the exact account was not accessible, the tumor weighed four kilogrammes, about ten pounds; comment is unnecessary. We find in the record of another case that the tumor was very large and its entire removal proved impossible, and in another that death followed the removal of a very large tumor. The youngest patient, eleven months old, died after the removal of a tumor designated as very large although the exact weight is not given. One operator unfortunately included the vena cava in the ligated pedicle, and another one lost his little patient, who

had been doing very well, by the accidental strangulation of a loop of intestine in the posterior opening in the peritoneum. These seven cases may justly be excluded from the consideration as due to accidents, or to be regarded as operations undertaken simply as the last resort; the operators and friends of the little patients having accepted the desperate chances of an almost necessarily fatal operation, as being preferable to certain death of a lingering and exceedingly painful character.

We would then have eighteen cases remaining. As the records of several of these have not been accessible it is not possible to analyze them more closely. Of these eighteen cases, we find that eight died from the immediate results of the operation, either from shock or septic complications, and that ten recovered. Of the ten that recovered six died of a recurrence of the disease in periods extending from five to eighteen months after the operation. Four were doing well when last heard from. One of these, however, is König's little patient, and as the operator saw degenerated mesenteric and retro-peritoneal glands, he consequently thinks that the child died of a recurrence, although he has not heard of its having done so.

From these eighteen cases we have fifty-five per cent. of immediate recoveries, but if the whole number of cases be taken this is reduced to forty per cent. Of those that recovered six subsequently died from a recurrence. The permanency of the cure is not established for all of the remaining cases, as not a sufficient number of years have elapsed to exclude the possibility of a return of the growth.

For a condition as desperate as this, nephrectomy certainly seems to be a beneficent measure and to offer the only avenue of escape to the victims of this malady from certain destruction. Can any arguments for or against the operation be drawn from the study of cases which have gone on to their fatal termination? Let us glance back and see.

The age of a majority of the cases certainly increases the danger of the operation. But infants undergo many major operations, and while there is greater liability to fatal shock than in adults, yet as the records of nephrectomy and other operations show, many pass this danger point in safety. One of the most remarkable cases, in this connection, was that of Dr. Park, which demonstrates very conclusively that even the removal of large tumors from very young children is not necessarily fatal. In this case a large fibrocystic tumor of the right kidney weighing four pounds was removed from a boy twenty-three months old. He was in excellent health a year after the operation. Godlee's case was still younger, but the tumor was not so large. Both children recovered with scarcely an unfavorable symptom.

Park's case is also a very interesting one in this connection, as its clinical history so nearly resembles that of a malignant tumor, in the

rapidity of its growth, its influence upon the general health, etc., that it might be almost impossible to make a differential diagnosis in a similar case; and if the diagnosis of a malignant growth should be made the patient might be allowed to die without an effort to save him, although the victim of a benign tumor, only malignant in its encroachment upon the functions of other organs. This little patient, to-day enjoying life and health, is the most eloquent argument for this operation, as but a slight mistake in such a case would result in the loss of a life that might have been saved. Who is so infallible that he is never mistaken in a diagnosis.

The presence of metastatic deposits in other organs would, of course, render any operative interference futile. But it has been shown that they are not very liable to be present, fifty per cent. of the cases remaining free from them even after the disease has run its course.

The remarkable immunity of even large tumors, of this class, from adhesions to the abdominal viscera renders their removal more rapid and less dangerous than it would be if adhesions were the rule.

The fact that in about one-tenth of all cases both kidneys have been found affected, increases the dangers of the operation and decreases the chances of a permanent cure. A careful examination of both kidneys should, therefore, precede every operation. In this way the presence of a second tumor might be discovered and the operation abandoned.

After a careful consideration of this question I must say that I am decidedly in favor of the operation, and think that if made when the tumor is still small, its results in the percentage of permanent recoveries will compare very favorably with those of malignant degeneration of other organs.

The abdominal incision was made in all but three cases. This was more from necessity than choice. In one case the lumbar incision had to be lengthened so far forward that the peritoneal cavity was opened in order to gain space. The lateral abdominal, or Langenbeck's incision, allows the posterior opening in the peritoneum to be made external to the colon more readily than the median abdominal incision. König's incision is an oblique one from above and external downward and inward diagonally across the tumor. This incision would probably give more room and permit the operator to ligate the pedicle with more ease than either of the others. Having opened the abdomen and explored the tumor to determine the extent of the adhesions if any, and, if possible, the opposite kidney to exclude a possible degeneration of it also, the next step is to open the posterior parietal layer of the peritoneum over the tumor. This should be done external to the colon and parallel to it in order to avoid the cœliac arteries. The tumor can then be readily dissected out from the retroperitoneal tissue, as has been shown not only

in the operations but also in the post-mortem examinations of cases that have died of the disease.

As in all nephrectomies, the question of ligating the ureter or of simply allowing it to take care of itself, is still sub judice. The ligatures on the pedicle should be cut off short and the pedicle returned to its normal situation. The incision in the posterior layer of the peritoneum might be carefully closed with sutures in order to leave the cavity, from which the tumor has been removed, behind the peritoneum, and cut off any subsequent suppuration here from the peritoneal cavity by drainage through a counter-opening in the lumbar region. This procedure would be particularly indicated when the dissection has been difficult and suppuration was to be feared. This practice has been followed after the removal of large retroperitoneal tumors with very gratifying success.

The operation, the statistics of which I have given, has so far succeeded in lengthening the lives of ten children, and of saving some of them. There is every reason to hope that in the future early diagnosis and early operations will show a much larger percentage of cures. As in all other malignant tumors, an early removal is necessary to success, but even late operations may lengthen life and possibly save it. König says, operate whenever it is possible. That is, make explorative incisions, and if extensive adhesions or visible metastatic growths forbid further interference, desist from the operation.

Let the teachings of more extended experience be our guide, and until its light burns more clearly let us not condemn these little unfortunates without making at least an effort to save them.

NOTE.—The twenty-five operations referred to were made by the following operators. König, three cases; Czerny, Rawdon, Godlee, Longstreet Taylor, Dandois, Jessop, Bardenheuer, Pughe, Kocher, Croft, Hueter, Meredith, Scheven and Mitzel, Ollier, Bantock, Reezey, Hicquet, Schoenborn, Little, Barker, Bokai, Jr., and Heath, each one case. The ten cases that recovered were the three cases of König, and the cases of Godlee, Dandois, Jessop, Bardenheuer, Croft, Hicquet, and Schoenborn. Of these, two cases of König, and the cases of Dandois and Schoenborn were doing well when last heard from.

Park's case is not included, because it was not a malignant degeneration of the kidney. It was doing well a year after the operation.

A CONSIDERATION OF
THE RESULTS IN 327 CASES OF TRACHEOTOMY,

PERFORMED AT THE BOSTON CITY HOSPITAL FROM 1864 TO 1887.

BY ROBERT W. LOVETT, M.D., AND JOHN C. MUNRO, M.D.,
FORMERLY HOUSE SURGEONS AT THE HOSPITAL.

(Concluded from page 170.)

WE herewith present the tables referred to in our article which appeared in the July number of this journal, and which were accidentally omitted from the text.
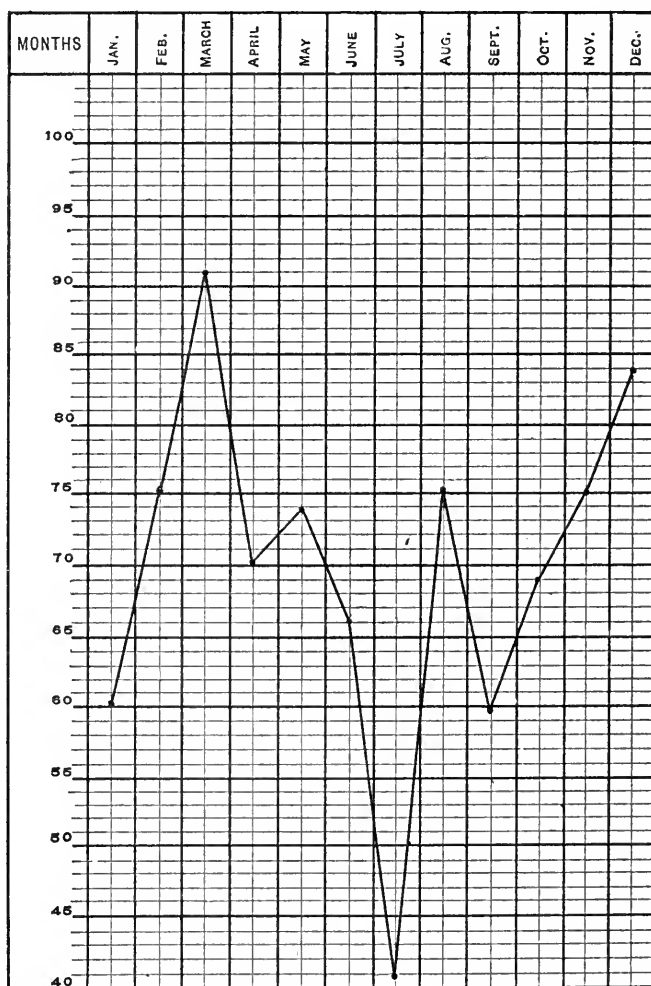
TABLE I. Curve of monthly percent of deaths after tracheotomy at the Boston City Hospital. *1881-85 inclusive.*
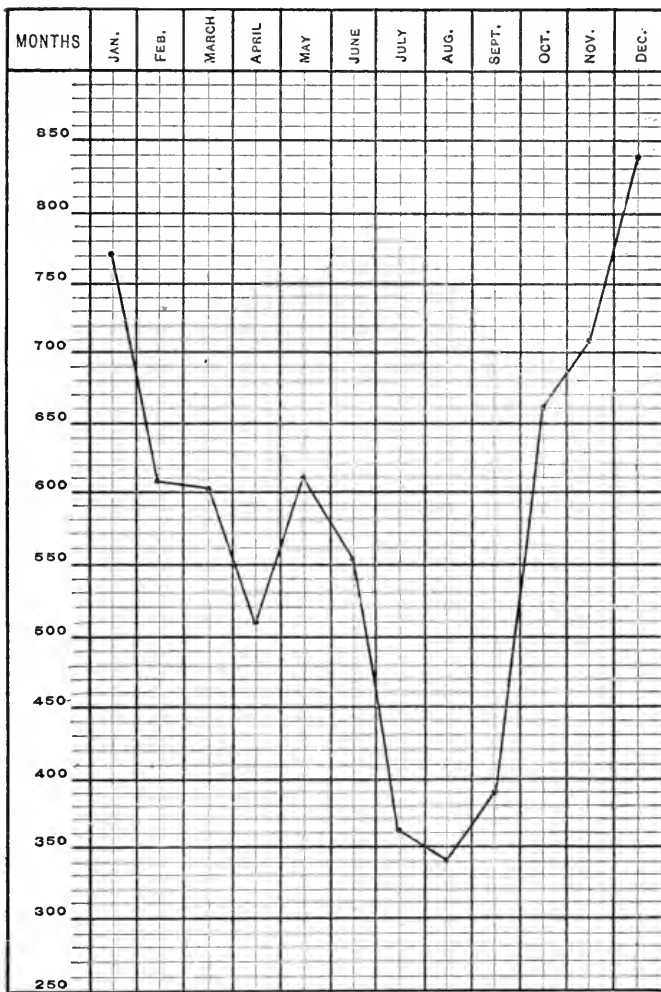
TABLE II. Curve of actual number of cases of diphtheria in Boston, by the month for 1881-85 inclusive.
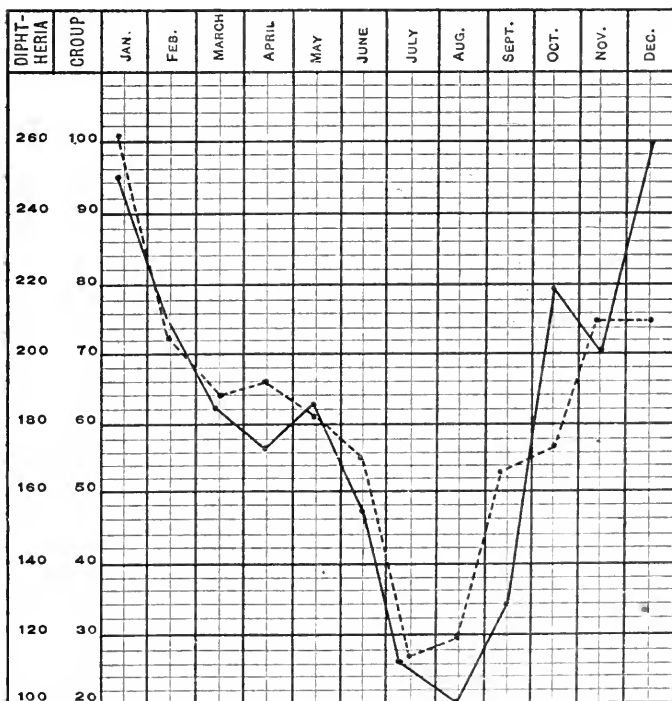
TABLE III. Curve of number of deaths by the month from Diphtheria and from Croup. 1881-85. inclusive.
Diphtheria ———— Croup --------
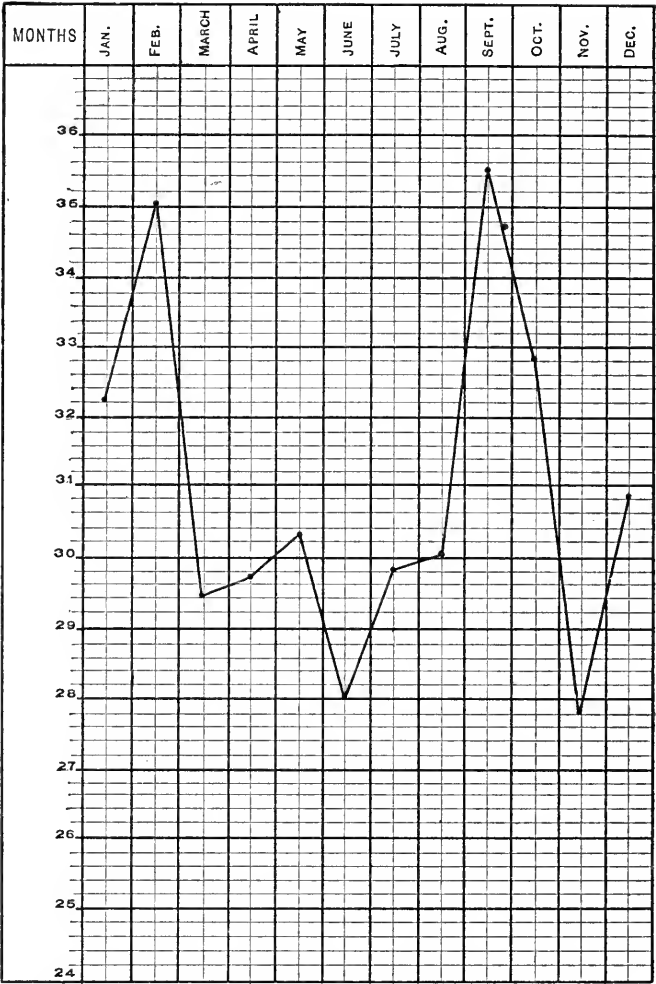
TABLE IV.   Curve of mortality percent of diphtheria.
              1881-85 incl. Proportion of fatal cases
              to cases reported.
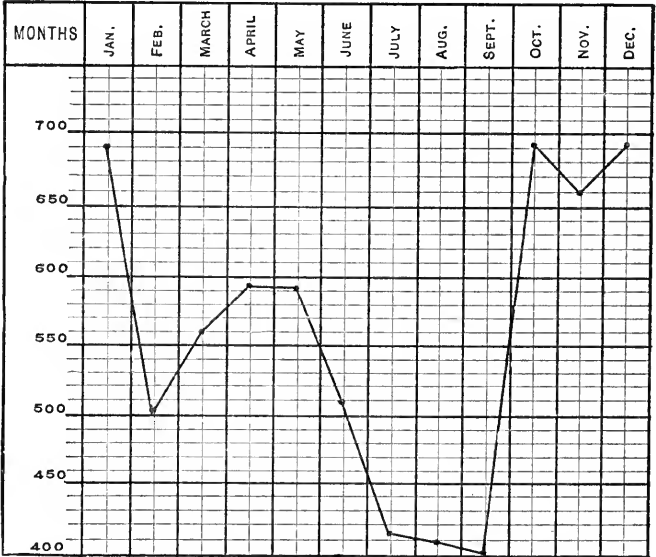
TABLE V.   Curve of prevalence of scarlet fever by the month.
              1881-85 inclusive Number of cases reported.

REVIEWS.

AUTOBIOGRAPHY OF SAMUEL D. GROSS, M.D., D.C.L. Oxon, LL.D. Cantab., Edin., Jeff. Coll., Univ. of Pa., Emeritus Professor of Surgery in the Jefferson Medical College of Philadelphia. With Sketches of his Contemporaries. Edited by his Sons. 2 vols. 8vo., pp. xxxii. 407, 438. Philadelphia: George Barrie, 1887.

WHEN it became known, soon after the death of Professor Gross, that he had left in manuscript for publication an extended autobiography, partly in the form of a diary, which he had kept for many years of his busy and varied professional life, a laudable curiosity, and, in some quarters possibly, an earnest anxiety was awakened to see its contents, to look behind that veil of conventionalism by which we are all more or less concealed from view, and from this nearer standpoint to become acquainted with the nature of the man himself, and discover, if possible, the sources of his remarkable influence and power.

His long-tried friends, who followed with him for more than a third of a century, and are now wearing the invisible crape of sorrow for the loss of his personal presence, will here find the reasons for the faith which was in them clearly transcribed, and can point with commendable pride to indisputable proofs, if such were needed, of the manliness of his character, the truthfulness of his nature, his generous and forgiving spirit, and the unsullied virtue of his noble life. In this frank disclosure of the thoughts of his heart, they will recognize a remarkable correspondence with his walk and conversation, and be convinced that the plane upon which he moved was of even greater elevation than they had supposed. Those who were once his enemies—and of these it is deserving of mention, that he had more than sufficient in number to exempt him from the Scriptural denunciation of those of whom all the world speak well —who in the earlier stage of his career scoffed at him from the roadside, but who, apparently, led by the desire for loaves and fishes, subsequently joined the company of his true disciples, and thereafter were accustomed to greet him with a widely heard "Hail, Master," when they met him in public places, will be also greatly gratified to learn from the record, that, not doubting the sincerity of their conversion, he admitted some of them to a high place in his regard. Those who persistently continued in their jealous opposition, and openly resisted his advance to professional premiership, if any such remain, will be sorely disappointed in their search here for even so much as mention of their names.

To make a satisfactory analysis of these two well-filled and admirably printed volumes would require the construction of an independent biography, a work of love such as has been already given in this journal shortly after the death of the illustrious author, and in the preliminary sketch prepared for the work by his affectionate friend, the late Professor

Austin Flint, Sr., M.D. Brief notices arranged somewhat in the form of a narrative of some of the more prominent features of the work is all that will be attempted here.

It has been said that some men are born to greatness and others have greatness thrust upon them. To neither of these classes did Dr. Gross belong. He was, not in its common acceptation, but in the truest sense of the phrase, a self-made man; not made by his surroundings, not forced by early poverty, privation, neglect, and the pressure of insurmountable difficulties upon the right hand, and upon the left to pursue an unselected pathway leading to an unknown country. He was directed to it by his own deliberate choice, when other and apparently easier routes presented themselves, and followed it assiduously with his eyes fixed upon the heights which ever beckoned him upward. The story is a fascinating one from the beginning to the end, and will of itself greatly interest the reader, without considering the many diversions by the way; but it can be learned only from the book itself. The road which was somewhat broken and circuitous, and in places rugged and precipitous, is here clearly delineated. In imagination one can almost count the steps as they are successively surmounted, while the exertion of the toiler is in a measure lost sight of in the interest and pleasure with which we contemplate the steady tread by which he gradually but surely and with encouraging voice passes all who started with him, many of them as zealous as he to attain the elevation upon which his feet alone were destined to rest.

He tells us that he was born upon the 8th of July, 1805, of Christian parents, in the possession of a fair allowance of this world's goods, and that, notwithstanding the pleasures and distractions of boyhood, he early determined upon a course of life from which he never afterward seriously swerved. This was the more remarkable, considering that he lost his excellent father when only seven years old, and his education was mainly under the control of his guardians.

Riding, fishing, shooting, swimming, snaring rabbits, and pitching pennies, to the last of which he subsequently ascribed much of his combined accuracy of eye and precision of hand, were the principal amusements of his leisure hours—of which he seems to have had not a few, despite the earnestness with which he applied himself to his studies. And here we see, even at this early age, an exhibition of a great gift, the power of combining without interference work and relaxation, which was such a striking picture of his after-life. In this he resembled von Humboldt, Sir James Simpson, Sir Humphrey Davy, and a few other fortunately constituted students, who, in addition to the performance of an enormous amount of intellectual and practical labor, found an abundance of time, not only for the exacting demands of the fashionable, polite society in which they moved, but also for indulgence in much unprofessional reading, and many innocent amusements. But, notwithstanding his frolicsome nature, and the zest with which he engaged in all the diversions of a boyhood spent in the country, he was never guilty, as he solemnly assures us later in his memoirs, of insobriety, gambling, or any other form of immorality.

At the age of seventeen, thinking himself sufficiently instructed to undertake the study of medicine, he entered the office of a physician, in Easton, his native town, and was set to work at once, as was the abominable custom at that day, upon old and obsolete books on the practice

of medicine, surgery, obstetrics, anatomy, etc.   He had the good sense soon to discover that this was not the proper course to pursue, and also that his previous education, especially in Latin and Greek, was not extensive enough to enable him to comprehend with readiness the technical terms which he enountered in his reading.   The result of this discovery is thus stated :

"With some degree of hesitancy, lest I should give offence, I disclosed my feelings to my preceptor, and, much to his honor, he at once released me from any obligation to serve out my term of study.   *This was the turning-point in my life.*   I had pondered the matter with much care; it had worried and fretted me for days and nights; and, as I was naturally very diffident, it required all the courage I could summon to make known my wishes.   The promptness with which they were seconded gave me such relief that I once more drew a long and comfortable breath.   I had made a great discovery—a knowledge of my ignorance, and with it came a solemn determination to remedy it."

He therefore resumed his preliminary studies, first at the academy in Wilkesbarre, then at a private school in the City of New York, and subsequently at the high school at Lawrenceville, New Jersey.   The two years thus spent were devoted mainly to the acquirement of the Greek and Latin languages, to which were added mathematics and geography, and a large amount of miscellaneous reading.   His piquant sketches of his teachers, and the relation of some of the incidents of his school-life, especially his visit to Trenton, New Jersey, to witness the arrival of General Lafayette, who was then (1824) on a tour through this country, make very pleasant reading; but what appears to us most remarkable is, that a lad of seventeen should possess the wisdom, and exercise the resolution, to suspend his professional studies in order to supply what he considered the deficiencies of his preliminary education, especially when it is remembered that he was quite the equal, probably much in advance, of any of his companions in the extent and accuracy of his scholastic acquirements.   It is most fortunate, however, that this discovery was made at such an early day, as it is usually only in after-life that the eyes of most men thus circumstanced are opened, when it is too late to correct the error.

That the classical training which he experienced during these two years was of incalculable service to him no one who is familiar with his writings can doubt; and yet it is due to the truth of his history to tell, what is not mentioned in his diary, that when, in 1845, a pupil in his office became the subject of similar convictions, and consulted him as to the propriety of resorting to Transylvania University, a noted classical institution at Lexington, Ky., he advised against the scheme.[1]   In fact, it would seem from an entry made July 18, 1883, that his early opinion as to the necessity and special advantage of the acquirement of the dead languages preliminary to the study of medicine, or any other profession save theology, underwent some modification.   This is not the place to discuss the question, but we may be allowed to express the hope that the views of Charles Francis Adams, Jr., have not been, and may never be, generally received with favor, even within the precincts of Harvard University.

Having secured the objects of the temporary suspension of his pro-

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[1] We have authority for saying that the pupil alluded to has never ceased to regret his acceptance of the advice.

fessional studies, and added to his other resources a fair acquaintance with mineralogy and the French language, he entered the office of Dr. Swift, in Easton, in 1824, and began seriously that unbroken succession of labors which ceased only with his death, sixty years thereafter.

In October, 1826, he matriculated in Jefferson Medical College, Philadelphia, then in the third year of its existence, and became the private pupil and intimate friend of its founder, George McClellan, M.D., Professor of Surgery. In consequence of the bitter opposition of the friends of the University of Pennsylvania to the "new school" and its originators, Professors McClellan, N. R. Smith, Eberle, Barton, Barnes, and Rhees, his association with these gentlemen brought upon him the ill-will of many influential men, from which, in a hereditary form, he was never able wholly to emancipate himself as long as he lived. But for this it is probable that he would have never left Philadelphia; and the great West, where he spent his best years, would have been denied the vast benefits of his personal presence and teaching.

He took his degree in the spring of 1828, and then opened an office in Philadelphia, and began at once that series of translations of French and German professional works upon which he spent most of the ensuing eighteen months. His practice at this time was exceedingly meagre, and starvation was staring him in the face, but this did not deter him. On the contrary, he was convinced that he could not only provide for himself but for *another*, who was equally brave to place herself by his side and share in his trials; and, it may be added, that never was a union of two loving hearts productive of greater mutual happiness.

During the eighteen months he spent in a Philadelphia boarding-house, vainly endeavoring to obtain a livelihood by the practice of his profession, he made the acquaintance of a number of gentlemen who became more or less prominent in different departments of work, of whom no one seemed to make so deep an impression upon his mind and heart as Dr. John D. Godman, the anatomist, naturalist, and author; the account of whose literary and scientific pursuits, as lecturer and writer, his desperate but futile contest with poverty, and his early death, fills two or three of the most interesting pages of the book.

He subsequently removed to Easton, and there he found the more lucrative field he sought, but it must not be supposed, however, that his pen was allowed to rest during this period of active outdoor work. On the contrary, he found time to write and publish a large octavo volume entitled *The Anatomy, Physiology, and Diseases of the Bones and Joints*, and a complete treatise upon descriptive human anatomy, which latter, however, was never committed to the press. In the former he was the first to call attention to the great assistance derived from the use of adhesive plaster in the treatment of fractures, a fact which he had observed in the practice of his former preceptor, Dr. Swift. It was at this time also that he was elected Professor of Chemistry in Lafayette College, at Easton, Pennsylvania. But as this was only a nominal appointment, nothing came of it. Indeed it was quite evident that he had no serious idea of occupying a chair, for the duties of which he confessed his total lack of fitness.

In the twenty-ninth year of his age Dr. Gross entered upon his long and brilliant career as a public teacher. He had accepted in 1833 the position of Demonstrator of Anatomy in the Medical College of Ohio, and in October of that year he removed to Cincinnati.

And here, too, began that series of annoyances—some of them ranking as positive and protracted vexations—to which he was more or less subjected through the envy and jealousy of open enemies and false friends, throughout his entire stay in the West. We do not desire to dwell upon this feature of his experience, but as it had an important bearing upon his subsequent history—as may be clearly shown by his unpublished letters—and may serve to correct the inference, which is likely to be drawn from the perusal of these pages, that his professional advances were always accomplished under a cloudless sky, we have only to accompany him to Louisville, Ky., whither he was called in 1840, to take the chair of Surgery in the Medical Institute of that city. But, not to anticipate, let us dwell a little longer upon his life in Cincinnati.

In 1835 he accepted the chair of Pathological Anatomy in the Medical Department of the Cincinnati College, then in process of organization under the leadership of Dr. Daniel Drake, who was already a noted teacher, having been a member of the faculty of the Medical Department of Transylvania University, at Lexington, Ky.; of the Medical College of Ohio, of which he was the founder; and of Jefferson Medical College, Philadelphia.

Dr. Drake, who was his senior by twenty years, and a man of very eccentric disposition, conceived a very great fancy for the young professor. This was fully returned, and soon ripened into an intimate friendship, which flowed on with increasing volume, and scarcely a ripple, until the death of the former in 1852. They were associated together in teaching, not only in Cincinnati, but subsequently, for many years, at Louisville, where they formed the two grand pillars of the medical college.

Dr. Gross's success in Cincinnati, as a teacher, a practitioner, and a leader in intellectual and polite society, was almost phenomenal; and when he left there a sensible void was produced in each one of these circles. He gives graphic descriptions of many of the noted workers with whom he became acquainted there, such as Nicholas Longworth, Lyman Beecher, Salmon P. Chase, Bishop, afterward Archbishop, Purcell, General, afterward President, Harrison, Bishop McIlvaine, Doctor Gamaliel Bailey, Dr. Drake, and others.

While here he wrote his great work on *Pathological Anatomy*, which made him not less famous abroad than in his own country, besides several valuable contributions to the *Western Journal of the Medical and Physical Sciences*. It was at this time, also, that he was offered and declined the professorship of Medicine in the University of Virginia, and the chair of Anatomy in the University of Louisiana.

The Louisville Medical Institute, afterward called the Medical Department of the University of Louisville, was founded in 1836 (?) by a secession from Transylvania Medical College, consisting of Professors Charles Caldwell, John Easton Cooke, Charles W. Short, and Lunsford P. Yandell, who added to their number Henry Miller and Joshua H. Flint, the latter a fresh importation from Boston, to fill the chair of Surgery, and, three years later, the illustrious Dr. Drake, probably the most brilliant teacher, philosophical thinker, and powerful writer that the medical profession of the West has ever produced. Dr. Flint,[1] having proved an utter

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[1] It is scarcely necessary to warn the reader against confounding with this gentleman the distinguished Professor Austin Flint, who entered the school some years later, and subsequently obtained a world-wide reputation as a teacher and writer.

failure, was compelled to retire in 1840, and Dr. Gross, who had never been engaged in teaching surgery, invited to occupy the vacant chair. The result of Dr. Flint's displacement added fuel to the flame of bitter resentment which had already manifested itself on the part of a large majority of the physicians of the city, none of whom had been invited to assist in the organization of the school. It may be readily imagined, therefore, that the appearance of Dr. Gross, another stranger, upon the scene was not calculated to allay the excitement, as may be learned from the facts stated in his Autobiography, and confirmed by abundant concurrent testimony.

Notwithstanding the triumph he soon achieved, the feeling of hostility continued with more or less force during his entire residence in the city; and such is the cancerous nature of enmity originating in jealousy and wounded *amour propre*, that some who were thus affected cursed the good man to whom they viciously ascribed their injury, long after he personally disappeared from their view. For this opposition and hatred he was, however, more than compensated by his great success as a lecturer and practitioner, and the numerous ardent friendships which he rapidly contracted with the best citizens of the town. Indeed, we hazard nothing in saying that no man, whether in or out of the profession, ever lived in Louisville, or possibly within the limits of Kentucky—Henry Clay alone excepted—to whom so many people became so strongly attached. He was a favorite with men, women, and children, rich and poor, white and black, bond and free, and when, at the end of sixteen years, he intimated his intention to remove to another field of labor, the whole community seemed to raise their hands and voices in earnest protest.

It should not be forgotten in this connection that Mrs. Gross was in her sphere quite as successful in captivating the hearts of the people as her illustrious husband. Her urbane manners, her intellectual acquirements, her sunny temperament, her remarkable powers of adaption, and her open-hearted hospitality rendered her parlors a rendezvous of agreeable and intelligent men and women nearly every evening in the week. Some idea of the powerful influence she excited upon him personally, and the great consolation which she afforded him in the midst of his many cares and anxieties, is manifest throughout the history of his entire married life. He loved her intensely, admired her exalted character, and was proud of the position which was accorded to her in general society. It is delightful to read the evidences of his great affection for her as they unconsciously break out in different parts of the record, and inexpressibly sad to witness the deep grief by which he was overcome, when, in 1876, she was laid away in her earthly grave at Woodlands Cemetery, Philadelphia. The high encomiums which he pronounces upon her in the later pages of his memoirs are fully sustained by the undimmed remembrance of her surviving friends. She was a noble Christian woman, and added lustre to the name and fame of her noble husband.

Although Professor Gross passed the best years of his life in Louisville—sixteen in number, including the single winter he spent in New York as Professor of Surgery in the University of New York—it is a little singular that his record of this period does not extend beyond thirty-four pages, more than twenty of which are devoted to brief, but interesting notices of some of the distinguished people with whom he

became acquainted while there. The list of these includes Henry Clay, John J. Crittenden, James Guthrie, James P. Espy—popularly known as the "Storm King"; von Raumer, the distinguished German historian—of whom a very remarkable incident is told; Reverend Robert J., Wm. C., and General John C. Breckinridge; W. J. Graves, the well-known survivor of a noted duel fought with Mr. Cilley, a fellow-townsman, and other less-distinguished characters. He also tells of his original investigations in wounds of the intestines by means of numerous experiments upon dogs, and of the treatise which he published upon this subject; of the composition of his work upon *Foreign Bodies in the Air-Passages*, the well-known volume upon *Diseases and Injuries of the Bladder and Urethra*, and his valuable *History of Kentucky Surgery*, in which last he disentombed the immortal remains of Dr. Ephraim McDowell, of Danville, the almost-forgotten originator of ovariotomy. During this period he also contributed liberally to the pages of the *Western Journal of Medicine*; and, after the death of this periodical, joined Dr. T. G. Richardson in establishing the *Louisville Review*, which was soon afterward transferred to Philadelphia, much extended in its scope, and published under the title of *The North American Medico-Chirurgical Review*.

It is remarkable, however, that but little reference is here made to his professional life, and his relations to his colleagues. It is true that he wrote brief memoirs of Caldwell, Drake, and Miller after their death, but there is a singular omission of any definite account of one or more affairs which were freely discussed in the public prints of that day, and became an essential part of the history of the medical school. Many of the readers of the autobiography might, therefore, suppose that there was nothing of special interest to relate in this connection, but, on the contrary, there is good reason to know, from personal knowledge of his private correspondence, that there was much to disturb his life, and sufficient in its unpleasantness to exert a decided influence upon his decision when he was invited to take the chair of Surgery in the City of New York, and subsequently in the Jefferson Medical College of Philadelphia.

It is sad, but, unfortunately, true, that in the history of medical education in this country, it is difficult to point to a single medical faculty in which the presence of inharmonious elements has not seriously marred or absolutely destroyed the usefulness of these institutions. The too-popular belief that the profession of medicine necessarily engenders antagonisms between its practitioners, is strongly substantiated by the histories of our medical faculties; and we do not hesitate, therefore, to say to all unfledged public teachers of medicine, that if they aspire at the same time to lives of peacefulness, they are upon the wrong route. We have already had some of the experiences of Professor Gross in the Medical College of Ohio and the Cincinnati Medical College related to us, but we miss the same frank expressions in regard to the school at Louisville. This institution was no exception to the others, as we learn from the newspapers of the time, in connection with the shovelling of Professor Caldwell out of the faculty in 1849. Some reference is made to this ugly procedure in the biographical sketch of the latter just alluded to, but the very strong Anglo-Saxon terms in which our author then expressed his indignation are considerably modified in the text.

As we have already seen, Professor Gross accepted the chair of Surgery in Jefferson Medical College in 1856, and removed the same year

to Philadelphia, where he passed the remainder of his days in com
parative quietude of mind, and the active pursuit of his profession as
practitioner, teacher, and writer. His distinction as a surgeon soon
brought him patients; and notwithstanding the small size of Phila-
delphia fees—of which he expresses his disapprobation in almost con-
temptuous terms—he was soon in receipt of an income, which, added to
that from the school, made him quite independent, but did not diminish
the laboriousness of his daily life. His literary work alone would have
more than occupied the entire time of almost any one else, to which the
six revised editions of his two great volumes upon *General Surgery*
(begun, it is true, in Louisville); the revision (or rather rewriting) of
his book upon *Pathological Anatomy*, and of the composition of his work
upon *Diseases of the Urinary Bladder*, etc., together with numberless
smaller contributions, bear ample testimony. Except for his vigorous
bodily constitution, his well-trained mind, and his habits of regularity
and sobriety—and, we may add, his cheerfulness of disposition—his
years would certainly have been much shortened. As it was, he con-
tinued to teach until he was seventy-seven years of age, and did not
intermit his daily labors until his death, two years later. As before
stated, his professional relations were, for the most part, of an unusually
agreeable nature; and as he outlived all his original colleagues, he has
embalmed their pleasant memories with those of numerous other friends
in biographical sketches, which appear at the close of the second volume.

The account which he here gives us of his private life, his food,
drink, and sleep, his amusements, his methods of work, his religion, his
miscellaneous reading, his manner of entertaining his friends, and the
sketches which he furnishes of the different members of his family, espe-
cially his much-loved wife, and of numerous friends and distinguished
strangers who partook of his generous hospitality from time to time, are
most entertaining and instructive, but must be read in his own well-
chosen words to be appreciated. He talks upon almost every conceiv-
able subject of popular and scientific interest, evolution, religion, public
amusements, politics, pistols, longevity, pictures, natural scenery, mar-
riage, etc. (the list is made at random), including matters of a much
more professional character.

To most readers, however, his more or less extended notices of public
men will probably prove most attractive. These occupy not less than
three-fourths of the record made after his removal to Philadelphia, not
counting the *forty-seven* distinct biographical sketches just referred to as
appended to the second volume. There was not a man of distinction of
any department of life, whether in this country or abroad, with whom
he came in contact, of whom something has not been jotted down, and
more or less amplified. Some of these sketches, especially those of Drs.
Drake, Dunglison, Sims, Hays, Mott, and Meigs, Archbishop Wood, and
Mr. Carey, are permeated by the aroma of true heartfelt affection, and
are written in his best style. The one devoted to Dr. Drake fills a
dozen pages, and is a worthy tribute of admiration and love to one of
the most remarkable men which the medical profession of this country
has yet produced.

Professor Gross visited Europe for the first time in 1868. He was
then in his sixty-third year, and at the zenith of his fame. He was, of
course, received with open arms by the leading men of the profession
wherever he went, and every possible means of pleasure and instruction

placed at his disposal. His account of this visit occupies more than a hundred pages, and is replete with most interesting comments upon places and people. In his wanderings upon the continent, no single spot seems to have delighted him more than the old town of Berne, in Switzerland, the interest in which centred in the house in which Albert von Haller lived for many years, and in which he finally died. From the time he began the study of medicine he was a great admirer of the celebrated Swiss physiologist, and evinced his regard by giving the name to his youngest son, now a well-known lawyer and *littérateur* of Philadelphia, and joint editor with his distinguished brother, Professor S. W. Gross, in the editorship of these memoirs.

In Vienna, Rokitansky, the celebrated pathological anatomist, was found in his workshop, surrounded by his pupils, and in the midst of a necroscopic examination. Indeed, it is difficult to conceive of this wonderful worker being found anywhere else, considering that he has made not less than *fifty thousand* such examinations; and yet, we are told, that "he finds leisure to frequent the opera and the concert, and to give social entertainments, especially musical soirées, being very fond of music and a good performer on the flute."

Billroth, the famous surgeon, was equally cordial, and invited him into his lecture-room, where he was engaged in what appears to have been an utterly useless exsection of a cancerous rectum ; and while he impressed his visitor as being a man of unusual ability, great resources, and large capacity for labor, he did not captivate him by his bold and almost reckless use of the scalpel. Dr. Gross adds to his lively description of the man—" Billroth is a good liver, fond of society, a composer, and a superior pianist ; in a word, a remarkable person, such as is rarely found in any profession."

In Berlin, he called first upon Virchow, who was also engaged in making a pathological demonstration upon a cadaver, but stopped to salute him and introduce him to the class, and after the lecture showed him through his extensive and thoroughly equipped laboratory and museum, exhibited his large collection of infantile syphilitic hearts and livers, and explained his thorough and painstaking method of practical teaching by means of the scalpel and microscope. As is well known, Virchow is also a statesman of the republican school, and a leading member of the Reichstag. He gave Professor Gross a large entertainment, which was succeeded by the following remarkable exhibition of regard :

"After the viands were pretty well disposed of, our host, availing himself of a lull in the conversation, drew forth a large volume from under the table, and rising he took me by the hand, and made me an address in German, complimenting me upon my labors as a pathological anatomist, and referring to the work, which happened to be the second edition of my *Elements of Pathological Anatomy*, as one from the study of which he had derived much useful instruction, and one which he always consulted with much pleasure. I need not say how deeply flattered I felt by this great honor, so unexpectedly and so handsomely bestowed upon me by this renowned man. I felt that I had not labored in vain, and that the compliment was more than an equivalent for all the toil and anxiety which the work had cost me."

Von Langenbeck was unremitting in his polite attentions :

"He invited me to his house, showed me everything about his hospital, introduced me to his class, and took special pains to perform upon the dead

subject some operations in which he had acquired unusual distinction.   As
an operative surgeon he enjoys an unrivalled reputation on the Continent of
Europe ; and it is questionable whether he has ever had a superior in this
branch of the healing art anywhere—Dupuytren, Lisfranc, Mott, Liston,
Syme, and Fergusson not excepted.   .   .   .   In visiting his wards he pointed
out to me three cases of excision of the shoulder, two of the elbow, one of the
wrist, one of the hip, one of the knee, and two of the ankle, together with one
of the shaft of the humerus, and one of both bones of the leg.   .   .   .   In all
such operations, as well as in recent fractures, whether simple or compound,
he applies at once a thick, immovable plaster-of-Paris splint, provided with
fenestra for drainage."

His next call was upon von Gräfe, and the account which he gives
of this remarkable man, his general appearance, his beautiful counte-
nance, his winning, child-like manners, his great benevolence of char-
acter, his style of lecturing, his mode of operating for cataract, and the
vast amount of work which he performed from day to day, is given with
a vigor and terseness worthy of a Macaulay.   It is sad to know that this
great ophthalmic surgeon, the reputation of whose judgment and skill
had already reached the furthest corner of the civilized world, was
removed by death two years afterward (1870) in the forty-second year
of his age.

It was here, also, that Professor Gross saw the famous microscopist,
C. G. Ehrenberg, blind and superannuated, to whom he bore a letter of
congratulation from the American Medical Association, which was after-
ward published in a pamphlet along with similar testimonials from
Agassiz, Gould, Dana, Torrey, and other distinguished scientists, and
also a poem addressed to him by Oliver Wendell Holmes.

From Prussia Professor Gross crossed the British Channel, and hur-
ried through London to Oxford, to be present at the annual meeting of
the British Medical Association, where he met for the first time Sir
James Paget, Professor Rolleston, Mr. Curling, and others of like stand-
ing, to whom he was already well known by correspondence and repu-
tation.   Thence he proceeded to Cambridge, and on to Norwich, where
the British Association for the Advancement of Science was then in
session, and where he had the pleasure of shaking hands with Sir James
Y. Simpson, J. Hughes Bennett, Broca, Baker, Humphrey, Partridge,
and others, by all of whom he was treated with marked distinction.   At
Edinburgh he was handsomely entertained by Mr. James Syme, than
whom, in his opinion, Scotland has probably produced no other so great
a surgeon in recent times.   While here he was also treated with the
greatest kindness and hospitality by Sir James Y. Simpson, who made a
very deep impression upon him, not only by his extraordinary personal
appearance, but by his charming conversational gifts, his great mental
activity, the great variety of his acquirements, and his earnest devotions
to the truths of the Christian religion as set forth in the Holy Scriptures.

In Dublin he saw Stokes, Adams, Corrigan, Tufnal, Collis, and others.
Of all these famed physicians and surgeons he gives us brief and often
life-like descriptions, along with mention of the particular work to which
their lives are devoted.   Upon his return to Philadelphia, after an
absence of five months, a large public reception was given to him, jointly
with Dr. Pancoast, by their professional friends.

He repeated his visit to England in 1872, accompanied by Mrs. Gross
and their son Haller, mainly to be present at Oxford on the thousandth
Commemoration Day of the University, and to receive the degree of

D.C.L.   He gives a pleasing account of the ceremony, in which the same honor was conferred upon Prince Hassan (of Egypt), Dr. George Burrows, and Sir Benjamin Brodie (chemist), with sketches of these and several other noted men whom he met there, together with an outline of the remarkable history of the University.   In London he was entertained most hospitably, visited with great interest St. Thomas's and King's College Hospitals, listened to the Harvein oration by Dr. Farre, was present at the anniversary dinner of the Royal College of Physicians, and subsequently of the Fellows of the Royal College of Surgeons, upon all which occasions he received marked attention, which, however, is only incidentally referred to in the narrative.

The next chapter, the XIVth, in the volume, containing less than thirty pages, embraces a period of nearly *five years*, and we cannot help thinking that large omissions have been made here by the editors.   Less than two pages are devoted to the meeting, in 1876, of the Centennial Medical Congress, the organization of which we know, from other sources, was not accomplished without some heart-burnings and jealousies.

We have here a notice of the meeting of the American Public Health Association in Philadelphia in 1874, at which he introduced resolutions petitioning Congress to establish a National Bureau of Health, with branches at the seat of each State and Territorial Government.   He supported these resolutions by a short but striking address, and they were unanimously passed, but with what result we need not stop here to indicate, as the object is only to show that he was the author of the plan adopted in part by Congress four years later, in the creation of the National Board of Health, a scheme which met with most ungenerous treatment by many members of the medical profession, some of the medical journals, and not a few politicians, with the effect, as everybody knows, of practically crushing it out of existence in a very little while after it was put in force.

But the most marked feature, in this chapter, is the account of the sickness and death of Mrs. Gross, in February, 1876, and a short sketch of her life and character.   He delights to dwell upon her excellent qualities as wife and mother, her Christian principles, her intellectual attainments, her cheerfulness of spirits, and her remarkable adaptability to the personal varieties of society.   It is refreshing and beautiful to see with what tenderness he clings to her memory in his afterlife.

In the record for 1877 we find first a notice of four or five pages in length of Sir William Fergusson, who died in February.   He analyzes his qualities as lecturer, operator, and writer, and ascribes his fame mainly to his dexterity with the knife.   Next comes an account of a visit to Baltimore and Washington, and the people he met.   Then his attendance at Chicago upon the meeting of the American Medical Association.   And lastly, a visit to Boston to be present at the commencement of Harvard University.   Here he met and describes his friends, Drs. Bowditch, J. B. S. Jackson, and E. H. Clark, and called upon Dr. Jacob Bigelow, who was then in his ninety-second year, blind and bedridden, to whom he ascribes merits, both professional and private, of the highest order.

The record for 1878 is largely occupied with reminiscences of medical men, such as Drs. L. P. Yandell, Washington L. Atlee, and J. B. S. Jackson, all of whom had just died, and Drs. Carr Lane, William Beau-

mont, and Charles A. Pope, all three of St. Louis, the last mentioned one of his private pupils, and a man of brilliant parts, large acquirements, and distinguished abilities as a teacher and practitioner of surgery.

The following year is marked by two notable events. First, the complimentary dinner given to him by the physicians of Philadelphia, in commemoration of the fifty-first year of his professonal life; and, second, his address, at Danville, Ky., at the dedication of the monument erected by the State Medical Society in honor of Dr. Ephraim McDowell. The dinner was a very grand affair, but as an account of it was soon afterward printed and privately circulated by the committee of management, it is only necessary to quote his words to the effect, "That there have been more costly and elaborate dinners, but there never has been one in which there was more rational enjoyment, or in which a more cordial and tender feeling was manifested for the man whom it was designed to honor."

During this year, while in attendance upon the meeting of the American Medical Association at Atlanta, he attempted to organize the Convention of Medical Colleges which had been called, at his instance, the year before, by the American Medical College Association, for the purpose of pledging the colleges, or a majority of them, to certain improvements in teaching, more particularly in the way of demanding a certain grade of preliminary acquirements, and increasing the requirement of attendance upon lectures from two courses to three. This meeting, from which he "had originally expected so much, adjourned *sine die* at the close of the second day's proceedings, thus ending, like its two predecessors, in 'smoke.'"

The entries of 1880 occupy *sixty* pages, and are full of interest, but, unfortunately, they must be passed over here with but bare notices of their contents. First there are charmingly written reminiscences of Drs. John Kearny Rodgers, David Hosack, and John W. Francis, all of New York, and long since dead—the last to go was Dr. Francis, in 1881.

Next comes an account of his visit to New Orleans. He was present at the commencement of the Medical Department of the University of Louisiana, on which occasion, in some remarks he made to the graduates, he characterized the late Dr. Stone as the "Great Commoner" of his profession, as Henry Clay was in politics. While in the city he was entertained at a public dinner given to him by the two local medical societies, and was treated with profuse hospitality at several private houses. He was very particular to call upon the widows of Drs. Charles A. Luzenberg and Warren Stone, and gives graphic descriptions of the interviews, and reminiscences of these two distinguished surgeons.

After his return to Philadelphia, he proceeded to New York to attend the meeting of the American Medical College Association and the American Medical Association. He was President of the former, and was much elated by its adoption of a resolution requiring the attendance of three courses of lectures obligatory upon the student before becoming a candidate for graduation.

"This important regulation is to go into operation in 1882–83, and there is little doubt in my mind that it will be generally adopted by the schools of the country by that time. When this object, so long prayed for by the leading physicians of the country, as well as by many of our more intelligent laymen, shall be attained, the nation will have cause to congratulate itself upon an event which cannot fail to be of vast benefit to it."

The failure of nearly all the schools, including the one of which he himself was the most distinguished professor, to adopt this course, was, subsequently, a source of great sorrow to him as well as to many others who had labored with him to effect this great advance upon our present system of medical teaching.

After the adjournment of the American Medical Association, he succeeded in organizing the American Surgical Association, initiated by him the previous year at Atlanta, and for which he had made every preparation by correspondence and personal interviews with many of the leading surgeons of the country. He was greatly mortified, however, when he found that the surgeons of New York, with possibly one exception, held aloof from the movement. He was made President, and lived long enough to see the Association under full headway, and with the prospect of a successful and brilliant career. He was elected by acclamation to the presidency for two succeeding years when he positively refused to accept the position again.

A few weeks later, July 7th, we find him again embarking for England, this time to receive from the University of Cambridge, along with eleven others, the honorary degree of Doctor of Laws, the highest in her gift, and to attend the meeting of the British Medical Association. The conferring of the degree was accompanied by a good deal of solemn and impressive ceremony.

After the numerous hospitalities, which continued for several days succeeding the grand ceremony, Professor Gross and his son returned to London, and thence to America, having been absent scarcely two months. Considering that he was then in his seventy-sixth year, it is not surprising that the numerous entertainments, breakfasts, luncheons, dinners, and suppers which he was compelled to attend during his stay in England, and six days' severe seasickness on the voyage back, should have pretty nearly put an end to his powers of endurance, and rendered his entrance into his own quiet house one of the happiest events of his long life. This desire for rest, of which he then felt the need more than ever before, may possibly account for the fact that we hear nothing more from him for seven months, when, on April 3, 1881, he has just received a letter from Sir William MacCormac, Secretary, inviting him to deliver an address at the ensuing meeting, in August, of the International Medical Congress, in London. He was obliged to decline in consequence of age and the dread of seasickness, but suggested the names of five American physicians, of whom Dr. Billings was selected. We need not stop to descant upon the wisdom of the choice, nor upon the distinguished ability with which the honor was in due time sustained.

This year, 1882, is specially marked by his resignation of the chair of surgery in the Jefferson Medical College, which position he had held for twenty-six years. He was succeeded, as is well known, by his son, Dr. S. W. Gross, as Professor of Principles of Surgery, and Dr. J. H. Brinton, Professor of Practice of Surgery.

In November, Professor Gross attended a large reception given to him in New York, by Dr. J. Marion Sims and his son H. Marion Sims. Two or three hundred distinguished guests, many of these not members of the medical profession and drawn from several of the adjacent cities, were present. The account of this grand entertainment, probably the most brilliant of its kind ever given in this country by one private gentleman to another, is more than modestly brief, but it is followed by

an extended biographical sketch of Dr. Sims, prompted by the author's warmest regard and admiration, and written in his most effective style.

"When the history of American Medicine shall be written," he says, " one of its brightest pages will be an account of the services of Dr. Sims, a name as enduring as the hills and valleys of South Carolina, his native State."

In March of the next year Professor Gross accepted an invitation to deliver the valedictory address to the graduating class of Bellevue Hospital Medical College, New York, in the course of which address he strenuously urges the young men to study carefully the American code of medical ethics, and to direct their lives in accordance with its sacred teachings.

The next thirty to forty pages of the second volume are devoted mainly to short biographical notices. Austin Flint, Sr., he denominates the American Laennec, and places him in the first rank of medical teachers, writers, and practitioners. Of Oliver Wendell Holmes he expresses the common opinion that his fame as a contributor to the literature of the country has so completely overshadowed acknowledged abilities as professor of anatomy that it is hardly necessary to speak of the latter.

Passing over his attendance at the annual meeting of the American Surgical Association at Cincinnati, where he was made sad by observing that all the old landmarks of the city had been obliterated since he came there forty-three years before to take the position of Demonstrator of Anatomy in the Medical College of Ohio, and over his subsequent attendance upon the meeting of the American Medical Association at Cleveland, Ohio, we come to an excellent disquisition upon marriage, and some of the more frequent causes of discontent between man and wife. He tells what a perfect wife should be, but fails to describe the perfect husband.

Next is a brief statement of his views upon the subject of cremation, and the impetus which his example has given to this procedure has been felt in all parts of the country, and will probably not spend itself until there has been a complete revolution of popular sentiment, in cities at least, in regard to the proper disposition of the dead.

The year closes with an account of the origin of the famous Wistar Parties in Philadelphia, which were suspended in consequence of the civil war, and have been but lately resumed; and with a notice of the life and character of the late Dr. Thomas S. Kirkbride, the celebrated alienist, and of Professor Sophocles, of Harvard University.

The entries made in 1884 comprise a number of reminiscences, and close with a copy of a formal invitation which he himself had just received, inviting him to Edinburgh to receive the honorary degree of Doctor of Laws from the renowned University, and which he was compelled to decline in consequence of his inability to make the journey. Here the diary ceases, but the story of the few remaining days of his life, which went out on May 6th, is given in the preliminary memoir of the late Professor Austin Flint, Sr.

Our task is ended, and we feel that we have fallen far short of even a fair analysis of these two deeply interesting volumes. We have made no comments upon, nor even given a list of Professor Gross's contributions or armamentarium of surgery, nor have we eulogized him as we

might as teacher, writer, and practitioner.   To attempt the former seemed out of place, the latter would have been unnecessary and superfluous. All that we can hope is, that we have awakened a desire upon the part of many of our readers to procure the book and read it carefully from beginning to end.   The private record of so good and great a man, and so distinguished a surgeon as Professor Gross, is certainly worthy of the closest study, and, were he living, nothing would rejoice his heart so much as to know that the contemplation of his life from this standpoint had reanimated the weak and halting principles of medicine, encouraged the young and ambitious aspirant, and added steadiness of mind and gait to those who are already far advanced upon the ever-ascending road to professional fame.

In conclusion, we earnestly commend the careful perusal of the work, not only to the profession, which was honored by the adoption and enriched by his incessant and well-directed labors, but to the general public, as the record of a life devoted to the best interests of the human race, and the welfare of every living creature.   T. G. R.

HÉMORRHAGIES UTÉRINES, ÉTIOLOGIE, DIAGNOSTIC, TRAITEMENT.   Par le DOCTEUR SNEGUIREFF, Professeur de Gynécologie a l'Universite Impériale de Moscou.   Edition Francaise rédigée par M. H. VARNIER, Interne des Hôpitaux de Paris, sous la direction de M. LE DOCTEUR PINARD, Professeur Agrégé a la Faculté de Paris, Accoucheur de l'Hôpital Laraboisière. Paris: G. Steinheil, Editeur, 1886.

THE ETIOLOGY, DIAGNOSIS, AND TREATMENT OF UTERINE HEMORRHAGES. By DOCTOR SNEGUIREFF.

WHILE uterine hemorrhage is not a disease, but a symptom, it arises from so many different causes, and hence requires for its cure so many different methods of treatment, that a volume like this devoted to its treatment is not inappropriate.   And probably in these days, when so much attention is given to tubal diseases, and such brilliant successes are achieved in their diagnosis and operative treatment, it is well that the attention of the gynecologist should be directed to disorders much more frequently met in practice.   Quite recently it was our duty to examine a young medical graduate, and to the question as to the difference between menorrhagia and metrorrhagia he could give no reply, and offered definition of neither; on the other hand, when the examination was turned to the tubes he proved omniscient of all salpingian compounds and derivatives; in the new knowledge he had neglected the older and the more important.

This incident confirms us in the view that in such a volume as the one before us we may meet an actual want, and we enter upon its examination with increased interest.

Between thirty and forty of the first pages are given to the general method of diagnosis of diseases of women, but this subject need not detain us.   The following part is occupied with the etiology of uterine

hemorrhages. The author divides these causes into organic and reflex, the latter being occasional, or predisposing; the chief of the former are, first, malignant degenerations, then benign, and following these are chronic phlegmasias of the uterus, abortion, pregnancy, and puerperal diseases, uterine displacements, ovarian apoplexies, hemorrhages of the pelvic peritoneum, and disturbances of general nutrition, from obesity, blood stasis, abdominal plethora, and finally, traumatic causes.

A table, prepared by the author, shows the relative frequency of hemorrhages from several of these causes. Thus 3 per cent of uterine hemorrhages result from endometritis, 25 per cent. from cancer, and 19 per cent. from fibromyomata. A second table shows the ages of those suffering from uterine hemorrhages resulting from different causes. In illustration, 58 per cent. of women suffering from metrorrhagia, who have passed forty-five years, have as its cause cancer, and 25 per cent. fibromyomata.

Cancer of the neck of the uterus is next considered. In presenting the symptoms the author directs attention more prominently, we believe, than any one else has to pruritus, which, in some cases, he states, becomes so severe as to render life unendurable; he attributes the disorder to gastro-intestinal complications, and has found that therapeutic means addressed to them have been the most successful in relieving the pruritus. In connection with this topic he also states that some patients, suffering with cancer, are tormented with pruriginous sensations abruptly appearing upon different parts of the body, and suddenly disappearing. These patients are especially liable to a rapid recurrence of cancer after extirpation.

Sneguireff has found in 90 per cent. of cases a characteristic white coloration of the vaginal entrance, and that independently of cancer of the uterus this peculiar white appearance is never presented except in women from sixty to seventy years of age, who are entirely free from diseases of the uterus or of its appendages. It is observed especially at the anterior extremity of the vagina, where there will be found at the level of the inferior border of the meatus two white bands directed along the sides, and they may extend so as to meet below at the level of the fourchette. He considers this white color-line as much more characteristic of cancer than the bluish hue of the vulva, first described by Jacquemin, is of pregnancy; this sign certainly demands the attention of observers.

In considering the subject of medicines employed in cases of uterine cancer the author gives a caution in regard to the use of chloroform, or of medicines acting upon the heart, lest this organ has undergone fatty changes; he mentions, in confirmation of this caution, instances in which the administration of ergot, used for the purpose of arresting hemorrhage, was followed by severe dyspnœa and cyanosis; the same effect, though in a less degree, was observed after the use of digitalis.

Sneguireff, in considering the radical cure of cancer of the neck of the uterus, states that in no form of the disease, whatever operation, slight or grave, be performed, in good or in bad conditions, can we be certain there will be no recurrence. "If, then, asked as to this, a vague response should be given; that will be very much better than to flatter the friends of the patient by deceitful assurances which can only discredit surgery and the surgeon."

Cancer and sarcoma of the body and of the fundus of the uterus are

next presented, but the subject is very meagrely considered, and we find no points of special importance.

We are somewhat surprised to find that the author asserts, in the discussion of fibromyomata, that these tumors may be congenital, for in the works of gynecologists in general there will not be found any confirmation of this; indeed, the youngest subject in which such a growth has been found was ten years old, the case of Seigel.

The author makes the following statement as to the progress of cancer, in case this should be one of the complications of uterine fibroids—he has met with seven examples of such complication—that this is especially characterized by its slowness, and the little tendency to invasion of adjacent tissues.

The following chapter discusses chronic metritis, endometritis, and lacerations of the neck of the uterus as causes of uterine hemorrhage, and then the subject of abortion is considered; but nothing worthy of special remark is here presented.

It is not necessary to continue an account of the causes of uterine hemorrhage, as presented by the author, and after a brief reference to the subject of congenital anteflexion of the neck and conical neck, we will pass to that of the treatment. Sneguireff states that anteflexion is the most frequent of developmental anomalies of the uterus. " Of 7599 patients, the number of anomalies of development was 790—that is, 10.40 per cent. Of the 790, 245, or 31.0 per cent., were treated for anteflexions. Add to these the cases of conical neck, 139, and of anteflexion with conical neck, the proportion is 59.11 per cent., so that more than one-half of the total number of congenital vices of conformation belong to anteflexion and conical neck." He further states " that of the different classes of society the middle educated class is more predisposed to this anomaly of development." He adds that much the largest contingent of patients who, in consequence of sterility resulting from anteflexion, come to consult the physician, is furnished by the Israelites. " The reason for this fact, apparently, is that in Russian families sterility is regarded neither as a dishonor nor a cause for divorce, while, for the married Israelites, a sterility of nine years may involve divorce; these women most frequently come after seven or eight years of marriage, seeking cure for their sterile condition."

Under the head of treatment, the author first considers that of metrorrhagia in general, and then of the different varieties in reference to their causation. Nevertheless, all hemorrhages from the womb do not require treatment, for their arrest may be followed by serious consequences, and still others may require very cautious cure. Thus, among beneficial metrorrhagias may be mentioned those observed at the menopause in obese, plethoric women, attacked by an affection of the heart, or of the liver, or suffering with atheroma; so, too, in some diseases of the uterus, in ovaritis, and in ovarian neuralgia, a moderate hemorrhage makes, as it were, part of the treatment. Moreover, if the tubes are involved, and liquid accumulated in them, a condition not unseldom present in chronic metritis, should contractions of the tubes be excited this fluid may be forced into the peritoneal cavity, resulting in a limited or in a general peritonitis; but as almost all the agents used as uterine hæmostatics cause contractions of the uterus and of the appendages, the accident mentioned may result from their use. Great prudence must be used in arresting a metrorrhagia which alternates with hæmoptysis, or

one occurring in nervous persons with hereditary predisposition to organic diseases of the central nervous system.

Among medicines ergot is first considered, the form recommended the infusion, and the cases to which it is thought especially applicable those of hemorrhage following labor or miscarriage—in general, whenever the uterus is increased in size and its tissues softened. The remedy has little effect if the uterus is hard and fibrous, and if then used is to be employed in small doses, or hypodermatically. If the hemorrhage has caused great anæmia, ergot gives but feeble results; it must be administered cautiously if the woman is nursing, lest the secretion of milk lessen or disappear. The perchloride of iron is advised in three-drop doses, three or four times a day, for those patients who have suffered a long time from menorrhagia or metrorrhagia. Digitalis in the form of infusion, is indicated in hemorrhage resulting from blood stasis in the abdomen or pelvis, and also in cardiac affections. The tincture of Indian hemp is valuable only when recently prepared. It responds to the following indications : It calms pelvic pain involving the uterus and its appendages, the bladder and the rectum, lessens the uterine flow, and produces sleep ; it is useful to relieve the suffering from chronic metritis, acute perimetritis, and parametritis, in dysmenorrhœa, in vesical irritability, in dysuria, and in painful defecation when the suffering arises from the uterus ; second, during pregnancy this agent acts very favorably upon the painful contractions and hemorrhages ; third, it is useful in the insomnia accompanying uterine diseases.

Among other uterine hæmostatics recommended are the acid of Haller, five to ten drops, three or four times a day, and phosphoric acid in an unstrained decoction of cinnamon ; the former is recommended in the metrorrhagia of pregnancy, or of beginning abortion, and the latter in hemorrhages depending upon the disease of Werlhof and those of scorbutus.

Next follows hydrotherapy in its various applications, very great prominence being justly given to vaginal injections of hot water. In regard to position when the injections are administered, he rejects the sitting, or half sitting, or erect, and insists that, as a rule, the patient should be recumbent : only in exceptional cases where the prompt arrest of an obstinate hemorrhage is desired is she to take the genu-pectoral position. In considering the effect of hot water upon the uterus he gives the following results : Lessened volume of the organ, the diminution being so much more marked as the consistence of the uterus is less ; diminution of pain ; lessened secretion from the uterus—though at first it may be increased, it soon diminishes and may entirely disappear ; in addition to the effect of hot-water injections upon the quantity of the secretion, the quality changes, and thus a leucorrhœa may lose its fetid character. Beside these results hot-water injections furnish the most powerful antiphlogistic means in gynecology. Hot-water injections, especially under the form of continuous irrigation, have a decided sleep-producing power ; some patients go to sleep during the injection, and others after it ; the sleep is brief, usually unattended by dreams, and is refreshing. In some cases, however, which are quite rare, hot injections cause sleeplessness, hallucinations, or even syncope, and then, of course, they should be abandoned. Among other unpleasant symptoms that may result are acceleration of the pulse, which may become irregular, palpitation of the heart, cardiac distress, hurried respiration, which may even present

some asthmatic characters. Vertigo, dimness of vision, and ringing in the ears may also occur, and when these are observed, of course, the injections must be at once discontinued. We know no writer who has entered so fully into the subject of hot-water vaginal injections, and we regard this portion of his work as of the greatest value; he, of course, acknowledges indebtedness to Emmet for this means of treating diseases of women.

The subject of continuous irrigation in puerperal fever is presented with considerable fulness, the writer having collected more than fifty cases in which this treatment was employed, but the propriety of introducing this subject in a work devoted to uterine hemorrhages is at least doubtful.

Cold injections, both intermittent and continuous, are considered, but since the author states he has abandoned them as hæmostatic means, no further reference need be made to the topic. He regards the use of ice in the vagina in the slighter forms of hemorrhage as useful; and so too, an ice bladder may be applied to the abdomen in conjunction with hot-water injections in the vagina: he gives a just caution in reference to the external use of ice, stating that in very anæmic and fleshy women the prolonged application of bladders of ice ought to be carefully watched, for frequently in fact superficial eschars are observed, especially if the patients have previously had irritant ointments applied, or continued application of hot compresses.

Revulsion to the surface by means of hot-water bags, et cetera, is briefly presented, as well as the similarly produced ischæmia of the internal organs by means of a hot bath. The value of special treatment by hydrotherapy is presented. He regards this treatment as useful in the hemorrhage due to obesity, in that which is associated with abdominal plethora in connection with intestinal atony and obstinate constipation, the uterus not having undergone malignant degeneration; in uterine displacements, especially retroflexion or retroposition with or without inflammation or tumors of the ovary; in subperitoneal or interstitial fibromata; in the hemorrhages of the menopause, and in those of chronic metritis. He warns against the danger from the application of cold water in the case of a patient who has previously had peritonitis, of a return of the disease, and also states the discouraging fact that in some cases the cure by hydrotherapic treatment is not permanent, and must be resumed a second or even a third year.

Intrauterine injections are briefly referred to. The author advises for these Braun's syringe, and regards tincture of iodine, one part to four of glycerine, or else the undiluted tincture, the best material for injecting; such a preparation as either would be a very feeble hæmostatic indeed, and probably the alcohol is really the most important agent, the quantity of iodine being so small. After giving the precautions necessary in case of hæmostatic uterine injections, he states that even with the utmost care the latter are not exempt from danger, and that they ought to be rarely employed.

Mechanical means, including the vaginal and the uterine tampon and massage, are presented, as well as hygienic and dietetic care pointed out. Next follows a chapter devoted to sun baths, for the use of which the author acknowledges his indebtedness to Emmet. These baths are prescribed for all patients who have suffered for a long time with affections of the genital organs, and have undergone various treatments, chiefly

cases of chronic metritis, chronic inflammation of the ovaries, of the peritoneum, with intestinal atony, dyspepsia, hysteria. The baths are taken in the following manner : The patient has the abdomen and lower limbs covered with black clothing, the chest and head with white; she lies extended upon a bed or couch in the full sun, an umbrella protecting the upper part of the body, while the abdomen and lower limbs are uncovered. For the first half hour she remains upon her back, and then turns upon her side, or upon her abdomen ; the bath lasts from one to two hours. In some cases twenty, in others sixty baths are employed.

The final portion of the volume is occupied with the treatment of the different affections causing metrorrhagia. Here we have presented the medical and surgical means used in malignant and in benign uterine growths, including abdominal and vaginal extirpation of the uterus, the treatment of endocervicitis and of endometritis, of bilateral laceration of the cervix by Emmet's method, of chronic metritis, of hemorrhage from abortion and during pregnancy, of the various positional disorders of the uterus, and other affections resulting in metrorrhagia. But having already occupied so much space with this notice, there is hardly room left to consider these several topics.

We have endeavored to present a fair analysis of this volume, and we think our readers will agree with us in concluding that the author has prepared a work which will prove quite useful to the profession.

T. P.

DERMATITIS VENENATA: AN ACCOUNT OF THE ACTION OF EXTERNAL IRRITANTS UPON THE SKIN. By JAMES C. WHITE, M.D., Professor of Dermatology, Harvard University. Pp. 203. Boston: 1887.

THE author of the book before us is a botanist as well as a distinguished dermatologist, and is, therefore, eminently qualified to deal with the subject in hand in its several aspects. We may state that the subject-matter has been prepared from a practical standpoint, supported by scientific methods of observation. It is an admirable essay, original and broad in its scope, and constitutes a valuable contribution to dermatology.

Under the title dermatitis venenata are included all those forms of inflammation of the skin which are produced by the direct action of irritating agencies externally applied, belonging to the vegetable, animal, and mineral worlds, and to other classes of matter more difficult of definition. Most frequently the inflammation is due to plants possessing irritating properties, but numerous other irritant substances, such, for example, as chemicals, dyes, and certain insects, also not infrequently act injuriously upon the integument. The effect produced upon the skin in all cases is an inflammation, varying greatly in degree and intensity, from a mild erythema to a severe and deep-seated disturbance. All grades and forms of the inflammatory process are met with. Erythema may appear as a defined lesion, a macule, or as a patch, and is usually accompanied with œdema, which is often marked, as, for example, in dermatitis from rhus. The wheal, papule, vesicle, bleb, and pustule, as well as the scale, crust, excoriation, ulcer, and scar, may all be modes of pathological expression.

The description given by the author of the intimate cutaneous changes that take place in these several forms of inflammation is original, and is presented with a masterly hand. In some cases the diagnosis of dermatitis venenata must rest alone with the history or etiology, the signs of inflammation being similar, if not identical, with other forms of disease arising from internal causes. Especially is this true where the subject attacked is eczematous—that is, is prone, from one cause or another, to outbreaks of eczema, of which instances in practice are, as is well known, sufficiently numerous.

The author first takes up dermatitis produced by plants, of which there are many capable of causing more or less cutaneous inflammatory disturbance. The list is by no means small, sixty being mentioned, which are either native or have been introduced into the United States. Of these we may distinguish those which are capable of producing injurious effects while growing, either by direct contact or near approach; those which act only when some part is purposely applied to the skin; and, thirdly, those which are active only in a concentrated form or through some principle artificially extracted from them. Some of these act by mechanical irritation, as, for example, the hairs of mucuna; some by special poison glands, as the stinging glands of the urticæ; some by emanations, as the volatile principle in rhus; others by contact with the acid or poisonous elements contained in the plants. Among the most poisonous, and those producing by far the most mischief on the skin, stand the anacardiaceæ, or rhus family, of which three species grow abundantly in the United States, namely, rhus toxicodendron, or poison ivy; rhus venenata, or poison sumach; and rhus diversiloba, or poison oak. Rhus toxicodendron, called by earlier botanists r. radicans, is also popularly known as poison vine, poison oak, and mercury. The second species, rhus venenata, the r. vernix of Linnæus, is also known as poison dogwood, poison elder, poison ash, and is a tree growing mostly in swampy places, reaching the height of about twenty feet. Rhus diversiloba is the common poison oak of the Pacific coast, and closely resembles rhus toxicodendron.

Dr. White gives a full and interesting account of these plants, directing special attention to points whereby they may be at all times readily distinguished, together with a complete description of the eruption, its peculiarities, and its treatment. While the numerous remedies which have been found to be more or less useful in the local treatment of this inflammation are briefly mentioned by the author, the excellent results to be derived from some of them are, we think, not referred to sufficiently. Thus, the great value of grindelia robusta, especially in the form of a fluid extract, largely diluted, is not specially mentioned. It is certainly one of our best remedies. The author is firmly of the opinion that there are no so-called specifics for this affection, black-wash, employed either alone or with some mild ointment or powder, as in vesicular eczema, being regarded for the majority of cases as by far the best application. In dispensary practice the following is generally prescribed: zinci oxidi, ʒiv; acidi carbolici, ʒi; aq. calcis, Oj.

The other plants, of importance, are arnica (used in the form of a tincture as a domestic remedy for bruises and sprains), which is capable of giving rise to a virulent dermatitis; white-weed, or ox-eye daisy; croton oil; goa powder; cowhage; and nettle. Next in order may be noted a list of other irritants, some organic, others inorganic, which

occasionally work mischief on the skin, many of which, such as arsenic, mercury, sulphur, tar, carbolic and salicylic acids, are, when properly employed, most useful remedies. Finally, irritants belonging to the animal kingdom, such as the mosquito, gnat, bed-bug, flea, itch insect, louse, spider, and caterpillar, receive brief consideration from the author.

Thus, it will be seen that Dr. White has opened a new field in dermatology, and has collected and brought together much practical information that before only existed in the form of widely scattered papers. The work has been well done, and we take pleasure in commending the volume to all who are in any way interested in the subject.

L. A. D.

RESEARCHES UPON THE VENOM OF POISONOUS SERPENTS. By S. WEIR MITCHELL, M.D., Member of the National Academy of Sciences, U. S. A., President of the College of Physicians of Philadelphia, and EDWARD T. REICHERT, M.D., Professor of Physiology in the University of Pennsylvania. Folio pp. ix. 186. 4 Woodcuts and 5 Plates. Washington City: Published by the Smithsonian Institution, 1886.

AN admirable piece of work which has even already won for itself a portion of the recognition its merits deserve, but which will be the starting-point for any more exhaustive investigation of the same nature in the future. A plain statement of facts observed such as is found in these pages is worth volumes of conjecture without experimental evidence to back it, and for that reason the work here recorded must always be of value and can never be neglected in future research upon this important subject—more important, of course, in parts of the world infested by venomous reptiles to a greater degree than are the Middle States of North America, but necessary even there for the possible results in rescuing life from the grasp of such deadly enemies.

The fact of the rarity of venomous reptiles in the region where this investigation was conducted limited its authors in a very serious way, because a large supply of snake venom was out of the question at any one time, so that their experiments were, to a certain extent, limited in time and variety. They have themselves, however, recognized these limitations, and with the modesty of the true scientific spirit claim nothing for their conclusions which is not fully justified by the premises upon which they are based. The work is, in some sort, a continuation of what was begun by Dr. Mitchell as long ago as 1858, and the spirit in which this report is written is well expressed by the authors in the sentence: "We have foreborne to overload this paper with comments on the later researches of others, and have made the discussion of our own work as brief as was consistent with clearness."

The work is divided into eleven chapters, and begins, as is most natural with a consideration of the "Physical Characteristics of Venom," which are fluids varying in color from a very pale amber to a deep yellow. Dried with moderate rapidity they become beautiful cracked masses closely resembling a mass of crystals, which are yellow, very

fragile and translucent, and retain their poisonous properties for years. Under the microscope, especially in vigorous reptiles, the venom shows a number of floating granular bodies which seem to increase in number as the vigor of the reptile decreases ; besides these bodies are also found a few leucocytes and epithelial cells, and always micrococci, together with other forms of bacteria in old specimens.

The specific gravities of various species of venom are mentioned.

Following this comes the consideration of the chemical aspect of venoms and several extremely interesting facts are here revealed.   Fresh venom, allowed to stand,.separates into a viscid fluid and a sediment which contains the granular bodies, epithelial cells, etc., and which, after thorough washing, gives absolutely no toxic reaction when injected into animals.   The toxic properties of venom are, therefore, to be looked for in the portion remaining after the removal of this "insoluble precipitate."   If this residue be placed in a dialyzer after mixing with water, a whitish precipitate will be thrown down in the dialyzer in abundance if the process be continued long enough.   This precipitate, thoroughly washed, gives reactions peculiar to the globulins, and the filtrate obtained in the dialyzer is shown by proper tests to contain readily dialyzable substances which belong among the peptones.   The authors, therefore, show that venom contains in varying proportions for different species of reptiles, specimens of two classes of proteid bodies— the one belonging among the globulins, the other among the peptones. The venom-globulin they found to be of a complex nature and capable of being resolved into three principles, each a globulin, by processes which they have given as names to the result—*i. e.*, water-venom-globulin, copper-venom-globulin, and dialysis-venom-globulin.   Each of these three substances was subjected to careful tests as to its behavior toward chemical reagents and its identity fully established.   This was also done in the case of venom-peptone, and both principles were ex-amined from the *Crotalus adamanteus*, the *Ancistrodon piscivorus*, and the *Cobra*.   In the case of the first the dried venom was found to contain 24.6 per cent of globulins, of the second 7.8 per cent., and of the third 1.75 per cent., and necessarily these varying proportions of the globulins and peptones in different venoms are of great importance in explaining the varying physiological peculiarities resulting from poisoning by different species of snakes.

The authors next take up the question of the "Effects of Various Agents on Venom," and employed moist and dry heat for varying periods of time and in varying degrees of intensity upon the venoms of different serpents.   Dry heat acting upon dry venom at 230° F. for thirty minutes did not destroy its activity, but moist heat at 212° F. for two minutes took away all of its active power in *Crotalus adamantheus* venom, and was even more marked in its effects upon the venom of the moccasin and cobra.   A number of chemical substances were used as tests with varying results upon different venoms.

Various methods of filtration were adopted with a certain amount of success, but snake-bile, the popular remedy for a snake-bite, was tried and found to have absolutely no effect in diminishing the toxic action of the venom with which it was injected.

Their experiments show very conclusively that as a local antidote, per-manganate of potash is the best for all snake poisons, and that ferric chloride is a very efficient destroyer of the venom of our own snakes,.

which owe their vigor to venom-globulin, but has little value as a local antidote to the peptone, which gives power to the poison of the cobra, and in any case its use is indicated locally in large, full doses. Bromine may prove efficacious as well as the strong alkalies.

The effects of venom when applied to various mucus and serous surfaces was next studied, showing that it might be absorbed with varying rapidity from such situations, and then the action of venom upon the nervous system was taken up. In the latter case all the observations tended to show that the respiratory centre is the most vulnerable point of the nervous system, that the coördinating and volitional centres are those markedly affected, that the sensory part of the spinal cord and the sensory nerves are next attacked, and finally, that the motor parts of the cord and the motor nerves are the last to succumb.

A comparison of the local effects of the globulins and peptones shows a marked difference between the two—in the former case there are local bleedings, fluid blood, and capillaries giving way soon after the poison reaches them—whilst peptone venom produces swift putrefactive changes, and shows but slight capacity to make fluid the blood or to corrode the capillaries.

A long series of experiments to discover the effect of venoms and their globulins and peptones upon the pulse-rate, was made. By this it was found that of the *globulins*, the water-venom-globulin is the most potent, the copper-venom-globulin the least so, whilst the results obtained with venom-peptones agree with those obtained with pure venom, producing a primary increase and a secondary diminution of the pulse-rate—the first effect by excitation of the accelerator centres in the medulla, and that the impulses are carried through fibres passing chiefly by the spinal cord.

The action of venoms and their isolated globulins and peptones upon the arterial pressure, was the next point investigated. The injection of pure venom subcutaneously producing a progressive fall of blood pressure, whilst intravenously the fall is sudden and marked, and may be immediately followed by death; whilst the results of the experiments upon globulins and peptones seemed to justify the conclusions that the isolated principles exert the poisonous actions of pure venoms on the blood pressure, and that their toxic effects are simply different in degree.

Naturally, the next thing to investigate was the effect of these venoms and the venom-globulins and venom-peptones upon the respiration, the results of the experiments upon this point being best given in the words of the authors, that "the primary action of all the above poisons, excepting the copper-venom-globulin, is to cause an increase in the number of respirations, and, secondarily, to diminish the respirations below the normal. Of the different principles, the peptone seems to exert the most decided power in causing the acceleration, while the copper-venom-globulin seems utterly to lack this action.

The experimental evidence offered as regards the pathology of venom is not so satisfactory as the rest of the paper—especially the methods employed for the isolation and cultivation of the bacteria observed in the venoms. The whole history of the action of venoms argues against the fact that their activity is due to the propagation of bacteria in the parts affected by the poison. Nothing, however, prevents the supposition that these poisons may be the *results* of the previous growth of bacteria in the mouths or venom-sacs of the serpents themselves—a point of

extreme importance, and one which these experiments have done nothing to elucidate.   This is the more to be regretted because it was an opportunity not likely to occur soon again.

The effects of the various venoms upon the tissues of the body—both macroscopically and microscopically—are well pointed out, and are well explained by the facts observed in the first portion of the treatise.   A summary of the conclusions reached closes the text, and a fine bibliography of the literature of the subject fitly ends one of the most creditable scientific productions of recent years.   An index and several fine plates leave nothing to be desired.   H. C. E.

LEÇONS SUR LES MALADIES DU SYSTÈME NERVEUX FAITES A LA SAL-
    PÊTRIÈRE.   Par J. M. CHARCOT, Professeur a la Faculté de Médecine de
    Paris, etc.   Tome troisième, 8vo. pp. 519.   Paris: A Delahaye et E.
    Lecrosnier, 1887.

LECTURES ON DISEASES OF THE NERVOUS SYSTEM DELIVERED AT THE
    SALPÊTRIÈRE HOSPITAL.   By PROF. J. M. CHARCOT.   Vol. III.

THE first two volumes of Charcot's lectures are so widely known, having passed through three editions and having been translated into several languages, that the third volume will be heartily welcomed by his many students and admirers.   It contains twenty-six clinical lectures upon various forms of nervous disease, delivered during the past four years at his clinique.   The majority have already appeared in the pages of *Le Progrès Médical*, but are well worth a second perusal.

The subjects discussed are muscular atrophy subsequent to joint disease, contractures of traumatic origin, tic convulsif, migraine ophthalmique, myelitis following sciatica, cervical pachymeningitis, aphasia, tremor, the classification of muscular atrophies, and various forms of hysteria.   The last named subject has attracted so much attention in France, of late, that it is not surprising that one-half of the lectures are devoted to its study; hysteria in males, hysterical contractures, hysterical monoplegiæ, hysterical coxalgia, hysterical mutism, and the treatment of hysteria by seclusion, being fully discussed.   The exact but none the less vivid description of cases, the exhaustive discussion of symptoms with interesting comments, and points of differential diagnosis, and the attractive style of the lectures, combine to make this volume as valuable an acquisition to any medical library as either of its predecessors.

It is possible in a short space, to call attention to only a few of the subjects of special interest which are treated.   The classification of muscular atrophies has only recently become possible, several new forms having been described since Charcot's first volume, which contained a reference to the subject, was issued.   He groups them in two categories: first, amyotrophies of spinal origin; secondly, primary progressive amyotrophies.   In the first category are included (1) the atrophy of amyotrophic lateral sclerosis; and (2) the progressive muscular atrophy of the Duchenne-Aran type.   In the second category are grouped (1)

pseudo-hypertrophic paralysis; (2) juvenile muscular atrophy of Erb; (3) progressive infantile muscular atrophy of Duchenne; (4) the hereditary form of progressive atrophy of Leyden; and (5) transitional forms of atrophy in which the muscle, though weakened, is not apparently reduced in size, of which Charcot describes several cases. It seems as though no very sharp line could be drawn between some of these forms, as the transitional cases described resemble two or more varieties. This chapter is profusely illustrated, but the plates are of an inferior kind, though made from photographs, and show less distinctly than could be desired the characteristic features of the various types.

Apropos of a case of disseminated sclerosis tremor is discussed. The tremor of sclerosis ceases during rest, and is increased by voluntary motion or by an effort to restrain it, and the extent of the excursion of the trembling hand may be considerable. In paralysis agitans the tremor continues constantly, is not affected by motion, may be restrained for an instant, and is a fine trembling, each finger moving individually. In both these forms as well as in senile tremor the oscillations are slow, four or five per second. In senile tremor oscillations of the head are quite constantly seen. In hysterical tremor the movement is more rapid, but is not as quick as in the vibratory tremor of alcoholism, mercurial poisoning, general paresis, or Basedow's disease. In the last of these the fingers never tremble individually. Tremor is not to be confounded with choreiform motions which are not oscillatory or vibratory, but are spasmodic twitchings.

The cases of aphasia described, merit careful study, being almost unique. One is the case of a man, who, while retaining his power to speak and to write, had lost the power to read at sight. By the aid of his muscular sense, however, he was able to recognize the meaning of printed language, for when he traced the letters which he saw he became conscious of their significance. Another case was one of defect of visual memory: faces, objects, and scenes once well known, being no longer either voluntarily recalled or recognized when seen. In both these cases homonymous hemianopsia was present; and this symptom is ascribed to a cortical lesion by Charcot, an admission which implies that his previous scheme of the course of the visual tract, which is unfortunately still reproduced in physiological text-books, has been abandoned.

It will probably be a source of disappointment to many readers to find so much space devoted to the subject of hysteria. But much valuable information is to be found in these lectures, which to many will be wholly new. The liability of spiritualistic séances to induce hysterical phenomena is illustrated. The subject of hysteria in the male is one whose importance must be admitted. Cases of this kind are, according to Charcot, by no means rare. "Judging from my daily experience, these cases are often misunderstood even by competent physicians. We all admit that an effeminate young man may present hysterical symptoms, especially after excitement, excesses, or emotional strain. But that a vigorous workman, rough and hardy, as for example, the stoker of an engine, who has never been excitable, at least, to all appearances, may become as hysterical as a female in consequence of the shock of a collision or accident, is a fact which seems to surpass our powers of imagination, but is not the less true. . . . What misleads us chiefly, is the notion that hysteria must necessarily present in males the same clinical pictures as in females. In the male, in fact, the disease is often

characterized by the permanence and tenacity of its symptoms. In the female it is its unstability, the constant change of symptoms, which is considered typical. Yet, even in the female there are symptoms which are permanent and difficult to modify or to relieve by medical means; hence, to affirm that because the symptoms are permanent there must be some organic or dynamic lesion is a fallacy. I hope to prove that the sensory hysterical symptoms even in the female have a remarkable tenacity just as in the male, and, also, that in the male, depression and a tendency to melancholy are observed very often in markedly hysterical cases, and that the variability of symptoms is not the rule" (pp. 252–254). Some very instructive cases are fully described to substantiate these positions. Many points of diagnosis between functional and organic affections are brought out incidentally in these chapters, and those which follow upon special forms of hysteria. Charcot claims the credit of originating the idea of the treatment of hysteria by seclusion, and adds his testimony to its efficacy. He also strongly commends hydrotherapeutic measures.

In one respect this volume offers a contrast to the first two volumes It is singularly lacking in pathological facts. It was one of the great merits of the earlier volumes that symptoms and lesions were brought into a logical connection, and perhaps their great success was due to the clear, definite pathological facts which give nervous diseases a tangible basis. The lesions of hysteria are still hypothetical, and hence the discussion of the disease is still unsatisfactory. It will be a disappointment to many, that no attempt is made in this volume to find a pathological basis for some of the abnormal functional conditions described. But the exact description of symptoms cannot be without result, and in this respect this volume of Charcot, like its predecessors, is a model for clinicians.   M. A. S.

A THEORETICAL AND PRACTICAL TREATISE ON ASTIGMATISM. By SWAN M. BURNETT, M.D., Professor of Ophthalmology and Otology in the University of Georgetown, D. C. With fifty-nine diagrams and illustrations. 8vo. pp. viii. 246. St. Louis: J. H. Chambers & Co., 1887.

IN this book of two hundred and fifty pages, the author has given us a fair treatise on astigmatism, and a very good bibliography of the subject.

The body of the work is divided into thirteen chapters, each of which has its separate bibliography. This necessitates a good deal of repetition, the same paper or work often bearing on the subject matter of several chapters, and also compels the reader sometimes to look over more than one list to find the reference sought. This, however, is not any great labor, since in each list the authors' names are arranged in alphabetical order. The author, in the preface, states his belief that he has recorded here "the title of every important paper on the subject that has appeared up to the year of grace, 1886." The bibliography is certainly very complete, but we fail to find in it any mention of the brief but exceedingly important communication of Prof. Stokes to the

British Association for the Advancement of Science, in which he described the lens that has since borne his name.

The mathematical portion of the work presupposes, on the reader's part, a fair acquaintance with the elementary principles of the subject, yet it is not written in the laconic, rigid style often adopted in treatises of the higher mathematics, and which is found most pleasing and serviceable to the advanced student; but the whole work is written in good English.

To one who has studied ophthalmology by the aid of our common English text-books, the following will be somewhat startling in its originality. "The asthenopia of astigmatism is of two kinds, which are usually denominated *muscular* and *nervous*. The first named form has its seat in the muscle of accommodation, being sometimes called accommodative asthenopia," etc. Now, following Gräfe and Donders, who proposed these terms, we have been accustomed to divide asthenopia into accommodative and muscular; the muscular being that variety which is *not* seated in the muscle of accommodation, but is wholly independent of it, arising in connection with the use of extra-ocular muscles. If the author desired to give to the term "muscular asthenopia" a new significance; and deliberately set out so to do, we think he should, to avoid confusing his readers, have given due notice of his design. But, if this is merely an error of inadvertence, it leaves a fine opportunity for improvement in the next edition of the book.

The cut representing the appearance of the fundus of an astigmatic eye, as seen by the direct method of examination, is worthy of especial note as the first attempt, among many, that has been at all successful in representing the appearance in question.

The student can, however, get a still better conception of this appearance, by following the suggestion of the author, to view an ordinary plate of the normal fundus through a cylindrical lens. The chapter on irregular astigmatism and conical cornea is particularly good, though it scarcely does justice to skiascopy, as the shadow-test is called, as a means of diagnosis.

In an appendix is given a statistical record of 806 astigmatic eyes belonging to 475 different individuals. In thirty-six per cent. of these the lens selected gave vision up to the normal standard. Not a very high percentage of good vision; but much better than the ten per cent. stated in the text as the proportion attaining this standard, this smaller proportion being based on the statistics of others. Dr. Burnett's statistics would be of more value if they represented in all cases the absolute refraction of the eye, as determined under a mydriatic. But from his expressed views as to the advisability of using mydriatics to determine the refraction, it is fair to infer that, in a considerable proportion of cases, only the manifest astigmatism has been ascertained; and this inference becomes certainty when we see that fifty-seven per cent. of the cases are set down as myopic astigmatism.   E. J.

LEHRBUCH DER ALLGEMEINEN UND SPECIELLEN PATHOLOGISCHEN ANA-
TOMIE. By ERNST ZIEGLER, Prof. der Pathologischen Anatomie und der
Allgemeinen Pathologie an der Universität Tübingen. Fünfte Auflage.
Bd. ii., 8vo. pp. 499, 1020. Jena: Gustav Fischer, 1887.

A TEXT-BOOK OF PATHOLOGICAL ANATOMY AND PATHOGENESIS. By
ERNST ZIEGLER. Translated and Edited for English students by DONALD
MACALISTER, M.A., M.D. Part II. Special Pathological Anatomy. Sec-
tions ix.–xii., 8vo. pp. 391. London and New York: MacMillan & Co., 1886.

THE great popularity in Germany of Ziegler's *General and Special
Pathological Anatomy*, is attested by its having passed through five
editions in six years. It is not difficult to account for this popularity.
The work covers all the subjects of both general and special patholog-
ical anatomy; it is profusely illustrated with admirable drawings; the
style is clear and concise; the arrangement of the text is perspicuous
and well adapted for the use of students; the abundant use of different
sizes of type forces upon the attention the points intended to be empha-
sized; the subject matter is a vivid presentation of the author's views
based largely upon his own researches and is not a mere reproduction of
all current doctrines in pathology; and the book is kept fully abreast of
the most recent advances in pathological science.

The book has been much improved in the fifth edition by many addi-
tions and alterations, by changes in arrangement and by the insertion of
new drawings, which now number 703. The changes are greatest in the
first volume which treats of general pathological anatomy.

The numerous drawings of microscopical specimens, many of them
colored, were made by the author and are excellent. It is especially to
be commended that those made with low magnifying powers predom-
inate. Less praise can be given to the drawings of macroscopic speci-
mens, of which a large number of new ones have been added to the
present edition. These are of very unequal merit, and some are posi-
tively bad, such as the drawing of the pearl disease of cattle (Fig. 309,
Vol. II.), of which the gross appearances are very characteristic.
Nevertheless, the employment of a larger number of macroscopical
drawings greatly enhances the value of the work.

By the introduction of a section on the Pathological Anatomy of the
Eye, by Haab, and one on the Pathological Anatomy of the Ear, by
Wagenhäuser, the work is made to embrace all departments of patho-
logical anatomy. It can not be said, however, that the amount of space
given to the various subjects is altogether commensurate with their im-
portance. While, for instance, six pages are devoted to speculations con-
cerning the inheritance of acquired conditions (essentially the views of
Weismann being adopted), the diseases of the nose are dismissed in scant
three pages, and a short paragraph suffices for neuroparalytic keratitis, a
subject of much interest from the standpoint of both general and special
pathology. How interesting and important is the pathological anatomy
of the nasal cavity, may be learned by a perusal of the sixteen pages on
this subject in Orth's recent work on *Special Pathological Anatomy*. It
would have added to ease of reference and to the completeness of the
book to have brought together in a compendious form the lesions of
some of the more important infectious diseases, and those following

various organic and inorganic poisons, as has been done in Birch-Hirschfeld's text-book of *Pathological Anatomy*.

Ziegler's text-book is characterized especially by the prominence given to histological details, particularly to the finer cellular changes, such as those occurring in the processes of hyperplasia, regeneration, and inflammation. We miss the clear, full, and accurate descriptions of gross pathological appearances, such as distinguish Förster's classical *Handbuch der Pathologischen Anatomie*, as a new edition of which Ziegler's text-book was originally intended. Nor in respect to the happy combination of gross anatomical and of histological descriptions does Ziegler's work compare favorably with Orth's *Lehrbuch der Speciellen Pathologischen Anatomie*, of which the first volume has recently appeared.

The rearrangement in this edition of the chapters in the first volume is a decided improvement, although we can not understand why the subject of embolism should be placed in a chapter entitled "General Considerations Concerning the Etiology and the Genesis of Diseases." It is somewhat significant that the chapter treating of "Malformations" should immediately follow that devoted to "Tumors," as indicating that these morbid conditions are perhaps akin, although Ziegler does not accept in its entirety Cohnheim's hypothesis concerning the origin of tumors.

In his interesting treatment of the subject of "Regeneration," as well as in other parts of the book, Ziegler shows the important *rôle* played by karyokinesis in pathological processes. Cohnheim's doctrine of inflammation is accepted in its essential features. The only origin of pus cells admitted by Ziegler is the emigration of white blood-corpuscles. Cells intended for the formation of new tissue are derived partly by proliferation from the fixed cells and partly from leucocytes, but of the latter only certain kinds, particularly the uninuclear ones, are capable of formative activity.

It is especially characteristic of the recent direction of pathological studies that no less than 118 pages of the new edition are devoted to the description of bacteria, in contrast to 60 pages allotted to this subject in the fourth edition published less than two years previously. In the preparation of the section on bacteriology the author acknowledges his indebtedness to the new edition of Flügge's *Mikroörganismen*.

The pathological anatomy of the brain and that of the spinal cord and of their meninges are considered together. This arrangement saves repetition, but it is often confusing and is less satisfactory than to describe the lesions of each organ separately. Ziegler attempts to clear up some of the confusion which has been introduced into this department of pathological anatomy by clinicians. Especially praiseworthy is his separation from myelitis of various atrophic and degenerative processes which have been erroneously placed in this category by clinical writers.

The chapter on the pathological anatomy of the lungs, although in many respects good, will commend itself less favorably to pathologists than the admirable treatment of the same subject by Orth in the work already mentioned. Ziegler regards the micrococcus Pasteuri of Sternberg (whose name is nowhere mentioned in the book in connection with this organism), as the cause of most cases of croupous pneumonia, although the bacillus pneumoniæ of Friedländer and the streptococcus pyogenes may be occasional causes. Fibrous induration is described as a not infrequent termination of croupous pneumonia, without any consideration of the arguments of Wagner and others that these cases of dif-

fuse interstitial inflammation differ from the ordinary cases of croupous pneumonia. The statement that miliary tubercles of the lungs always begin in the pulmonary parenchyma (connective tissue and inter-alveolar septa) and the accompanying illustration (p. 680) are in oppo-sition to the convincing researches of Arnold and of Baumgarten on this point. Much described and pictured as broncho-pneumonia in the chapter on pulmonary tuberculosis would be much better designated tubercle.

The ordinary classification of Bright's diseases into acute nephritis, chronic parenchymatous nephritis, and chronic indurative nephritis or contracted kidney is adopted. The frequency is ignored of patches of atrophy and of increased interstitial tissue in the kidneys grouped under the heading of chronic parenchymatous nephritis, a designation which is rendered of doubtful propriety by the existence of these changes.

Ziegler was wise in selecting an ophthalmologist to contribute the "Pathological Anatomy of the Eye," for this subject can not be treated satisfactorily by one not familiar with ophthalmoscopical appearances. Haab has presented in a brief but satisfactory manner a department of pathological anatomy of great interest and one too much neglected by professional pathologists. The pathological anatomy of the ear is treated too aphoristically to afford more than a bird's-eye view of the subject.

In view of its many external and not a few internal merits, Ziegler's *Pathological Anatomy* cannot fail to prove attractive to medical students, as has already been demonstrated; with teachers and investigators in pathology it is not likely to occupy so high a rank as some of its pre-decessors and competitors.

English readers are to be congratulated upon the completion of **Dr.** MacAlister's translation of Ziegler's text-book, of which the first two volumes have already been reviewed in this journal, and the volume containing sections ix. to xii. has since been published. The sections treating of the pathological anatomy of the eye, ear, bones, muscles, and genital organs have not been translated, on the ground that these subjects pertain to surgical pathology. In the translation of the concluding volume advantage was taken of the improvements in the fourth German edition. W. H. W.

ABDOMINAL SURGERY. By J. GREIG SMITH, M.A., F.R.S.E., Surgeon to the British Royal Infirmary; Late Examiner in Surgery, University of Aber-deen; Fellow of the Royal Medical and Chirurgical Society, London, etc. 8vo. pp. 600. Philadelphia: P. Blakiston, Son & Co., 1887.

THIS volume will supply a much desired want, not only to the prac-tical gynecologist, but also to the general medical reader, who may wish to inform himself as to the progress of abdominal surgery. Written in a simple, clear, and condensed style, and covering almost the entire range of abdominal operations, the work has already attracted the atten-tion of many American readers, who appear inclined to regard it favor-ably, although coming from the pen of a young man, as yet little known on this side of the Atlantic. Although very creditable to its composer,

we feel in our criticism inclined to draw attention to certain minor points, which ought to be corrected in a second edition.

Silkworm gut has not in this country stood the test of experience as a suture material for the abdominal wound. When carefully prepared and shot-clamped, it will occasionally produce "stitch-hole abscesses" which are at times long in closing, and for this reason some operators have abandoned it for the silver wire. Certain snoods appear to be infected, either by reason of impurities received in their preparation, or it may be, by disease in the silkworm itself, and the most careful asepsis will at times be disappointing. Where a drainage-tube is used, a long unsecured suture should be inserted opposite the centre of the tube, to be twisted or shotted after its removal.

The author remarks with reference to Mr. Lawson Tait's first oöphorectomy (August 1, 1872): "By some mistake, Battey records this case as being fatal" (page 147). Dr. Battey, in *The Medical News* of July 24, 1886, page 110, says, "this is another slip of the pen: at no time have I said that this patient died."

"Though Thomas and others claim to have diagnosticated the condition (extrauterine pregnancy) before rupture, it is unfortunately the case that the first sign of it usually appears at rupture" (page 159). American gynecologists are particularly sensitive upon the subject of their ability to recognize an early Fallopian pregnancy by the history, sensations, and touch. One of the foetuses destroyed under the galvanic current by Prof. T. G. Thomas, has proved the correctness of his diagnosis, by escaping from the rectum. Twice have we seen early foetal cysts exsected in this city, before rupture, after a careful diagnosis. The words "claim to" should be omitted.

"One operator has had recourse to the doubtful expedient of making space by turning the bowels outside the abdomen altogether" (page 169). This is quite a common practice with the best American operators, in cases where working space is wanted, care being taken to cover the intestines within a warm, prepared cloth, and to keep them warm until returned. We have seen this done repeatedly, and no ill effect follow.

The Improved Cæsarean. "A sufficient number of cases has not yet been recorded to enable us finally to judge of the risks of this operation" (page 259). Possibly the author may not be aware that 55 operations have been reported, with 39 women saved, and 50 children delivered alive. Last year (1886) there were 22 cases, with 4 deaths. These figures promise well.

In laparo-elytrotomy the bladder has been lacerated in one-half of the cases (6), instead of one-third (4), as stated on page 261.

"The results so far," in primary laparotomy for extrauterine pregnancy, "have been 17 operations with 15 deaths" (page 284). We will increase the first figure to 26, and give the foetal loss as 14.

Mr. Holmes did not (Feb. 21, 1885) first supply to English readers, as stated on page 335, an account of Prof. Pietro Loreta's operation of digital divulsion of the pylorus, unless the word "English" be intended in a national sense. Prof. Loreta read the first account of his operation on Feb. 11, 1883, and on April 21, 1883, a full statement, with a record of four cases, was published by the reviewer, under a request from Bologna, in *The Medical News*, pp. 434–438. Prof. Loreta has of later years made his abdominal incision in the *linea alba*, whether for pyloric or cardiac stenosis. These operations must always be limited

mainly to Italy, for the reason that the conditions calling for them are much more common there than in the rest of Europe.

The illustration of the Czerny intestinal suture on page 412 is incorrect, as it is to be passed through the mucous membrane. This error is not to be wondered at, as it is found also in Treves, on *Intestinal Obstruction*, 1884, p. 485, and in Sänger's " Der Kaiserschnitt bei Uterusfibromen," 1882. The Czerny-Lembert suture will be found described in *The Medical News* of May 21, 1887, p. 588.

Dr. E. Hahn, of Berlin (April, 1881), was not the first to perform the operation of *nephrorrhaphy*, as stated on page 457, as this was done in Mobile, Alabama, prior to 1870. The kidney broke loose from its anchorage, and was removed by Dr. John T. Gilmore, in December, 1870, who found a cicatrix in the organ, two inches long, where the tape had cut its way out. The nephrectomy was entirely successful. Dr. Gilmore failed to give the name of the operator who preceded him in the case.

We are glad not to have found any errors of vital moment in Mr. Smith's creditable work, which bears the evidence of an extensive and painstaking research in the literature of America and the chief countries of Europe. It will, no doubt, be very extensively read in this country, and is of special value for its teaching in diagnosis.

<div align="right">R. P. H.</div>

Transactions of the American Gynecological Society, for the Year 1886. Vol. II. 8vo. pp. 516. New York: D. Appleton & Co., 1887.

This Society now consists of 58 active and 15 honorary Fellows. Its last annual meeting was held in Baltimore, on September 21, 22, and 23, 1886, at which there were present 29 Fellows.

As our allotted space will not admit of a *résumé* of the papers read, we will confine our remarks to a few of the more striking. Dr. Henry P. C. Wilson excited the attention of the Fellows, and provoked a prolonged and chiefly adverse discussion, by reading a paper in which he advocated the old plan of incising the posterior lip of the cervix uteri, " in some forms of anteflexion of the uterus, with dysmenorrhœa and sterility," based upon an experience of over four hundred cases in eighteen years.

Dr. Ellwood Wilson, of Philadelphia, recommended an application of nitrate of silver in strong solution, one drachm to the ounce, at intervals of five days, several times repeated, as a means of healing recent lacerations of the cervix uteri, and gave an account of six cases thus satisfactorily treated, thereby avoiding a resort to trachelorrhaphy.

Dr. John Goodman, of Louisville, read a paper in condemnation of the use of ergot, at the close of the third stage of labor, based upon the results in two cases, one ending fatally, in which he had administered it. His opinion gave rise to a long discussion, in which the weight of testimony was in favor of the use of the drug in moderate doses.

The paper of Dr. Fordyce Barker, on " The Influence of Maternal Impressions on the Fœtus," was listened to with much attention and discussed at great length. The subject is one of the curiosities of ob-

stetrics and embryology, and much was brought forward that would appear to make it possible for a maternal impression to show itself in the fœtus, after the period when embryology teaches us that the growth of the body, arms, and legs has advanced to their completeness of development. Coincidences are often very singular and difficult to explain, and so the *post hoc propter hoc* argument is resorted to. We confess to being rather sceptical upon this subject, except as to the effect of impressions experienced in the early formative stage of the embryo.

Dr. John Byrne, of Brooklyn, gave his experience in the use of the galvano-cautery in the treatment of procidentia uteri, in which he appears to have met with very marked success. In one case he amputated the cervix close up to the insertion of the vagina; in a second, he burned a gutter around the cervix with a platinum knife, and then partially amputated the cervix at the bottom of the groove by a platinum loop heated moderately; and in three other cases, in addition to the partial amputation, the vagina was grooved by the cautery knife, making three diverging fissures, one central, one toward either side on the anterior, and one only on the rectal surface, for a distance of about three inches, and through the hypertrophied vaginal membrane.

The long paper of the volume is that of Dr. George J. Engelmann, of St. Louis, entitled "The Use of Electricity in Gynecological Practice," which covers 149 pages. This is followed by one of 12 pages on "Electrolysis in Gynecological Surgery," by Dr. William H. Baker, of Boston, based upon the treatment by galvanopuncture of 14 cases of uterine fibroids. Dr. Baker advocates puncturing at intervals of one, two, or three months. In one of his cases the tumor entirely disappeared; in twelve it diminished from one-third to a half; and in the remaining case there was little or no effect. He also reported the successful treatment by the same method, of a case of perimetritic effusion, after failure in obtaining relief under the ordinary treatment recommended in such cases.

"Persistent Pain after Abdominal Section," is the title of a paper by Dr. James B. Hunter, of New York. This is a subject of much interest, but the cause is sometimes unaccountable. Operations for the relief of pain fail, and in some cases a cure follows a long period of suffering. The ligature has no doubt much to do with the production of pain in some sensitive subjects.

Dr. James R. Chadwick, of Boston, demonstrated the value of the bluish color of the vaginal entrance as evidence of pregnancy, shown by his examination of 281 pregnant women. The color was absent in 31, and doubtful in 28 cases; in 42 it was characteristic, and a general deep tint existed in 102.

Dr. W. H. Parish, of Philadelphia, reported a Cæsarean operation, and made a statement in reference to the growing mortality under this method of delivery, and the reasons for it, in the United States.

The unusual number of seven papers were contributed to the volume by candidates for admission to fellowship. We are glad to see this increase in the Society, and the introduction of new, young, and active workers to take the places of those recently lost by death and resignation.   R. P. H.

DER AUGENSPIEGEL UND DIE OPHTHALMOSKOPISCHE DIAGNOSTIK.   Von
DR. F. DIMMER, Docent in d. Wiener Universität, etc.   Pp. 175, with 73
illustrations.   Leipzig und Wien, 1887.
THE OPHTHALMOSCOPE AND OPHTHALMOSCOPIC DIAGNOSIS.   By DR. F.
DIMMER.

WE confess to great disappointment in this book.   When a teacher in
the great Vienna school, of many years' experience, writes a treatise we
have a right to expect some actual contribution to our knowledge.   We
do not look for a rehash of what has been written ever so many times
before and often better, and yet this is what a Docent in the University
of Vienna and an assistant of the great Arlt offers us.

The only things which could, even by courtesy, be called new, are the
description of Schmidt-Rimpler's method of determining refraction by the
indirect method of ophthalmoscopic examination, and a good description
of skiascopy, or retinoscopy, as he calls it, both of which could be ob-
tained equally well from other sources at the command of the student.
In the descriptions of changes in the fundus, constant references are made
to the atlases of Jäger and Liebreich, the possession of which is necessary
for the understanding of the text.   A most natural and pertinent ques-
tion is, If the reader has the atlases with the descriptions of the authors,
what need has he for Dr. Dimmer's descriptions?

<div align="right">S. M. B.</div>

HYSTÈRIE ET TRAUMATISM.   Par le DR. PAUL BERBEZ.   8vo. pp. 127.
Paris : A. Delahaye et Lecrosnier, 1887.
HYSTERIA AND TRAUMATISM.   By DR. PAUL BERBEZ.

THE surgical aspects of hysteria, under which title the author includes
paralysis, contractures, and joint affections of hysterical nature develop-
ing after injuries, have recently been studied by Charcot, and this little
brochure by one of his pupils contains an interesting review of the sub-
ject.   It covers a portion of the ground included in Page's work on
railroad injuries.

The author finds the real cause of all hystero-traumatic phenomena
in the special mental condition preceding the injury, and thinks that the
injury itself has little to do with the special form of disease developed,
since in many cases no evidence of trauma is found and the result is out
of all proportion to the severity of the injury.   Age, sex, occupation,
race, and temperament have nothing to do with the etiology, but emo-
tional excitement, especially fear, is a potent factor in the production of
these effects.

Monoplegia is the form of paralysis most frequently seen ; it is remark-
able for its completeness, and the limb is perfectly helpless and flaccid ;
the tendon reflexes are preserved or diminished, never lost ; the loss of
motion is accompanied by a total loss of sensation and of the muscular
sense ; to the latter symptom the author attaches much importance in
diagnosis.   Paraplegia may occur and paralysis of a part of one limb

is occasionally seen; in the latter case it is one segment of the limb which is affected and not the muscles in the distribution of one nerve, as in true traumatic cases. In all cases the electric excitability of the muscles is preserved; their mechanical excitability is increased, but not infrequently a slight atrophy occurs; the temperature of the limb may fall, it may become cyanotic and the nutrition of the skin may be changed, but bedsores do not form. Paraplegia also occurs. Paralysis with contracture is the second form considered with its attendant deformities. In this condition voluntary motions are very limited and are unable to diminish the contractures or to affect the deformity; there is often an increase of the reflexes, and general sensibility is abolished except over certain irregular zones which are not uniform. Desquamation of the skin is often seen, and a progressive atrophy of the muscles without change in electric excitability is noticed.

When paralysis with contracture is associated with pain in the joint the condition is termed arthralgia, and this resembles so closely organic lesions of the joint that diagnosis is often difficult. The pain continues during rest, it is increased by motion, its distribution is the same as in real joint disease, the attitude and deformity are identical with those in joint disease, and the only differential sign of value is the existence of hyperæsthesia of the skin around the joint and on the limb. But under ether all the signs of joint disease disappear, and hence, anæsthetics offer the chief aid to diagnosis.

The author cites a large number of cases in illustration of these conditions. An interesting fact discovered by Charcot is that all these forms of disease can be produced by suggestion in hypnotized persons, a fact which seems to him to prove that the mental state and not any physical condition is the underlying cause of all such affections. The conditions produced by suggestion may include abolition of motor power, with preservation or exaggeration of the tendon reflexes, and persistence of the electrical excitability, and also total loss of sensations of touch, temperature, pain, and of the muscular sense. Such a condition has no tendency to recover spontaneously and it is only by counter-suggestion in the hypnotized state that it can be removed. The character of the paralyses and contractures thus produced is identical with that of those occurring after injuries in hysterical patients. It is, therefore, evident that the latter have a psychical origin. In the hypnotized state the brain is in a semisomnolent condition; attention, consciousness, judgment, and will are weak; memory, imagination, and emotion are active. The brain then acts only from incoming sensations or suggestions with little or no control. Tell the person hypnotized that he cannot move his arm, and the idea of powerlessness takes possession of his mind and neutralizes all the ideas of movement which former experience has given him. The same is true of the person injured, except that it is the injury which acts as the cause of the idea of weakness.

It is evident that explanations such as this may be probable, but are hypothetical, and that all attempts of the kind are unsatisfactory. The facts, however, are of interest. Nor is it any better to assign as a cause of contracture a "*diathése de contracture*" or a "special excitability of the spinal cord." It is, perhaps, fortunate that the various phenomena of hysteria are being so carefully studied by the French school, but we cannot but think that M. Berbez, like many of his *confrères*, is unable to give a theory to account for the facts which will resist criticism. In

regard to treatment of these cases, it is evident that it must be directed to the mental state. It is possible to act on this, however, by physical means, and hydrotherapy and electricity, with massage, are the measures considered by the author as of greatest service. M. A. S.

THE TOPOGRAPHICAL ANATOMY OF THE CHILD. By JOHNSON SYMINGTON, M.D., F.R.S.E., Lecturer on Anatomy, School of Medicine, Edinburgh. Edinburgh, 1887.

THIS magnificent work forms one of the most important and most valuable of the recent contributions to human anatomy. Topographical anatomy is usually considered independently of the age and sex of the subject, and there can be no question that many of its data require reconsideration.

The present work is founded upon the examination of a series of frozen sections of the bodies of children. It is illustrated by fourteen life-sized colored plates, and by a number of woodcuts. Of the excellence and fidelity of the plates it is impossible to speak too highly. They reflect the greatest credit upon the publishers.

The vertical medial sections and some coronal sections of the thorax are the most valuable. Sections are given of all parts of the trunk ; of the skull, to show the orbits and nasal fossæ ; of the neck, to show the position of the larynx ; of the thorax, abdomen, and pelvis.

The first part of the work is devoted to a critical explanation of the plates. The second part deals systematically with the more conspicuous results of the author's investigations. The topographical anatomy of the auditory meatus and tympanum, the condition of the spinal curve in children, the topography of the brain, and the relational anatomy of the male and female genital organs, are all dealt with in an able and original manner.

Dr. Symington's book abounds in original material. It is a work that no anatomist can afford to overlook. It adds materially to our knowledge of the most practical branch of anatomy, and is a credit to modern scientific research. F. T.

A PRACTICAL TREATISE ON DISEASES OF THE EYE. By DR. EDOUARD MEYER, Prof à l'École pratique de la Faculté de Médecine de Paris, etc. Translated, with the assistance of the Author, by FREELAND FERGUS, M.D., Ophthalmic Surgeon, Glasgow Royal Infirmary, etc. 8vo., pp. 650. Philadelphia : P. Blakiston, Son & Co., 1887.

IN his brief preface the author tells us this work was prepared for the press nearly fifteen years ago, and that portions of it had then already been published ; but so thoroughly has this English edition been revised,

and so well has it been brought up to the present state of our knowledge, that this would not be suspected from a perusal of the work.

A somewhat elaborate classification of the diseases of the eye is embodied in the book, involving its division into chapters and articles, and the latter by headings, subheadings, sub-subheadings, and paragraphs; but the arrangement of the various parts is natural, and a good index gives the intelligent reader direct access to all parts of its store of information; fitting it to be the reference book of the practitioner who does not hold himself especially familiar with this branch of medical practice. And this function, of a work of reference for the general practitioner, is the one this book is particularly fitted to perform. In this direction it is eminently "a practical treatise." But for the student desirous of mastering the subject of refraction, or the use of the ophthalmoscope, the first essential steps in the preparation for ophthalmic practice, it would prove rather an unsatisfactory manual. For instance, while we are given cuts and descriptions of the binocular ophthalmoscope of Giraud-Teulon, the fixed ophthalmoscope of Liebreich, and the ophthalmoscope for two observers of Sichel, instruments that have served merely to demonstrate the ingenuity of their inventors, and to take up the pages of "systematic" treatises on ophthalmology for the last quarter of a century, not a single modern refraction ophthalmoscope is figured, or even mentioned; and the shadow-test gets but a brief, obscure, inaccurate allusion, under the name of *Skiaskopia*. Color-blindness, too, receives but little attention.

An excellent feature of the work is the giving, before the consideration of the diseases of each part, of a clear, succinct account of such points in its anatomy as bear directly on the pathology, diagnosis, or treatment of those diseases. A case of this kind, where diagnosis and therapeutics will be fixed by a knowledge of anatomy, is presented in hyperæmia involving the white of the eye. Here, when the injection is most pronounced back from the cornea near the fold of the conjunctiva, as it passes from the eyeball on to the lids, and the enlarged vessels form an irregular network freely movable over the deeper sclerotic, the trouble is conjunctival. But when the pink coloration is deepest and most distinct at the margin of the cornea, where the individual vessels are scarcely visible, while from this marginal zone, straighter, less movable vessels radiate backward toward the retrotarsal fold, the centre of disease involves the cornea, iris, or ciliary body; and the case is much more serious, and demands different treatment. Dr. Meyer brings out this point in diagnosis, and illustrates it very well by a diagrammatic representation of the two kinds of hyperæmia, both separately and coexistent.

We note in passing that our author is a believer in *amblyopia ex anopsia*, and even attempts to trace its disastrous progress.

The translator has done his part carefully and well. The colored plates are selections from Liebreich's *Atlas of Ophthalmoscopy*, and are well executed, as are also the woodcuts, and, indeed, the printing throughout. E. J.

QUARTERLY SUMMARY

PROGRESS OF MEDICAL SCIENCE.

ANATOMY.

UNDER THE CHARGE OF

. GEORGE D. THANE, M.R.C.S. ENG.,

PROFESSOR OF ANATOMY AT UNIVERSITY COLLEGE, LONDON.

ON THE SYNOVIAL SHEATH OF THE RADIAL EXTENSORS OF THE WRIST.

In the *Revue de Chirurgie* for 1882, LARGER described a second synovial sheath to the radial extensor tendons, surrounding them where they are crossed above the wrist by the thumb-muscles. DEBIERRE and ROCHET state (*Archives de Physiologie* for February, 1887) that they did not find this sheath in any one of more than forty subjects examined; but in all cases there was a small bursa, which Larger refers to as accidental, between the tendons of the radial extensors and the extensor ossis metacarpi and primi internodii pollicis. This bursa is the ordinary seat of painful ganglion in this region. The synovial sheath of the radial extensors beneath the annular ligament is usually single, but occasionally double. It always communicates with the sheath around the extensor secundi internodii pollicis, the aperture being placed over the tendon of the extensor carpi radialis brevior, and leading into the inner division only of a double sheath.

ON THE NERVOUS SUPPLY OF THE LUMBRICALES.

H. ST. JOHN BROOKS shows that the nervous supply of the lumbricales in the hand is subject to frequent variations, and that the current statements with regard to the nerves of these muscles in the foot are incorrect. In the hand, the prevalent condition is for the median nerve to supply the first and second, and the deep part of the ulnar the third and fourth; but in many cases the third lumbrical has a branch from the median as well as one from the ulnar. More rarely the second has also a double supply; or, on the other hand, the median supplies wholly the first, second, and third, and the ulnar the fourth only. Ten feet were examined, and in nine of these only the first lumbrical was supplied by the internal plantar, the rest deriving their nerves from the deep part of the external plantar. In the tenth case the first and

second muscles received twigs from both plantar nerves; the third and fourth from the external alone.   The author believes that originally all the lumbricales were supplied on their superficial surface, and that the deep nerve is gradually displacing the superficial, thus illustrating Cunningham's proposition that in mammals the ulnar and external plantar nerves are encroaching upon the territory of the median and internal plantar respectively.   There is an evident general correspondence between the innervation of a particular belly of the flexor profundus and of the corresponding lumbrical: the indicial belly and the first lumbrical are supplied exclusively by the median; the fourth belly and fourth lumbrical are supplied typically by the ulnar only; and the third belly and lumbrical have usually a double supply; but while the same is the case with the second belly, it is very exceptional in the second lumbrical (*Journal of Anatomy and Physiology*, July, 1887).

On the Pharyngeal Orifice of the Eustachian Tube.

Casimir von Kostanecki deals with the cartilaginous and membranous portion of the Eustachian tube in a long article, illustrated by twenty-four figures showing different forms of its pharyngeal ending.   The paper consists of detailed descriptions, and cannot, therefore, be satisfactorily abstracted; but the chief general points are as follows:

The position of the pharyngeal orifice is not the same at different periods of life, and is subject to many individual variations.   It often differs somewhat on the two sides in the same person.   The distance from the anterior nasal spine varies from 5.3 to 7.5 cm.   Vertically, its most frequent position is behind the inferior concha, at an average distance of 10 mm. above the hard palate; but it is sometimes behind the middle, at others behind the inferior meatus.   In the fœtus the orifice is below the hard palate; at birth on the same level.   From the roof of the pharynx the average distance is 11 to 12 mm.; the extremes 9.5 to 15 mm.   From the hinder wall of the pharynx, 10 to 19 mm.; average, 12 mm.   From the inferior concha, 4 to 14.5 mm.; in children under one year, 7.5 to 10.5 mm.

The typical form of the opening is that of a triangle, the upper angle of which is rounded off slightly, while the base below is convex upward, owing to the projection of the belly of the levator palati toward the lumen.   The two lower angles are thus prolonged as grooves along the floor of the tube and the upper surface of the soft palate—*sulcus salpingo-palatinus, anterior* and *posterior*.

The anterior or outer lip of the orifice is frequently indistinguishable, the outer wall of the tube being continued directly into the side wall of the nose; but in the great majority of cases it is marked by a distinct fold—*plica salpingo-palatina*, determined by a fibrous band, the *ligamentum salpingo-palatinum anticum*.

The opening of the tube is affected by the tensor palati, levator palati, and salpingo-pharyngeus.   The contraction of the levator raises the floor of the tube, and so reduces the vertical diameter of the orifice, but at the same time it pushes upward the inner plate of the cartilage, thus making the lumen wider.

The recess of Rosenmüller, or *sinus faucium lateralis*, varies in depth from

0 to 17 mm., and is continued downward by a groove which is named *sulcus pharyngo-oralis lateralis.*   In addition to the foregoing, the *sinus faucium superior* of Tortual is recognized, a small depression above the prominent end of the tube (*Archiv für mikroskopische Anatomie,* June, 1887).

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF
ROBERTS BARTHOLOW, M.D., LL.D.,
PROFESSOR OF MATERIA MEDICA, GENERAL THERAPEUTICS, AND HYGIENE IN THE JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

STENOCARPINE; A NEW AND POWERFUL ANÆSTHETIC AND ANALGESIC OF INDIGENOUS SOURCE.

The most remarkable discovery since Koller's demonstration of the analgesic power of cocaine, is that just made by MR. GOODMAN, a veterinary surgeon of Louisiana, and DR. ALLEN M. SEWARD, of Bergen's Point, New Jersey.   Mr. Goodman ascertained, by the merest accident, that analgesic and anæsthetic properties were possessed by the leaves of a tree, known in the locality where it grows, as the "Tear Blanket Tree."   Obviously, this designation is significant of the injury done by the sharp spines, with which the tree is plentifully garnished.   It is greatly to Mr. Goodman's credit that he had the sagacity to observe and to reason from his facts.   The leaves of the tree were submitted to Dr. Seward, who isolated an alkaloid, to which he gave the name *stenocarpine.*

The physiological actions of stenocarpine have been carefully studied by DR. CLAIBORNE and DR. KNAPP, both of New York.   Their conclusions agree closely for the most part.   A two per cent. solution, with which Dr. Claiborne was supplied, was employed by both investigators, Dr. Knapp having obtained a small quantity from his colleague.   As the powers and properties of cocaine are so well known, a comparison of the new anæsthetic with its older cogener will develop their respective qualities the more fully, and by the contrast, when differences are found, more characteristically.

Stenocarpine acts as an analgesic and anæsthetic when applied in solution to the mucous membrane at any point.   Dr. Claiborne asserts that it has the same influence on the sensibility of the skin; but Dr. Knapp did not find it so, although his negative result may be attributed to the small quantity of the alkaloid with which he operated.   When a plentiful supply of the new alkaloid becomes available, this question can be easily and finally settled.   Injected beneath the skin, an anæsthetic area is produced, having the limits which the extent of the diffusion determines, as is, also, the case with cocaine.

When applied to the conjunctiva the anæsthetic effect takes place in from five to ten minutes, and in from ten to fifteen minutes the pupil dilates and the accommodative apparatus becomes paretic and then paralyzed.   As com-

pared with cocaine, the effects of stenocarpine on the pupil and on the accommodation are far greater. The dilatation of the pupil is nearly equal to that produced by atropine, but it is not as persistent. In certain cases the pupil of the other eye contracts to a mere pin's head in size. The anæsthetic and analgesic effects are quite equal to those of cocaine in corresponding strength.

Stenocarpine is more actively toxic than cocaine. It causes tetanic spasms not unlike those of strychnine (Knapp); but the tetanoid paroxysms are accompanied by trembling, weakness, and incoördination, and, finally, paralysis ensues—a fact that indicates exhaustion of the centres, at first stimulated. Very rapid action of the heart occurs, probably because stenocarpine paralyzes the pneumogastric, and thus removes the inhibition. As the effects deepen, paresis of the respiratory muscles comes on, and ultimately they become paralyzed, the action of the heart failing after respiration has ceased. Although additional observations are needed to settle the nature of the influence exerted on the respiration and circulation by stenocarpine, there is little doubt that the explanation above given will prove to be true.

Knapp's observations on the therapeutical applications of the new remedy, and the comparison between it and the actions of cocaine, are characteristically thorough, and have an enduring interest for all those practising ophthalmology. We have space here for the principal points only.

Whenever, with the actions of an anæsthetic, a mydriatic is required, as in iritis, stenocarpine is preferable to cocaine. It is also better than atropine when there is a tendency to glaucoma, and much pain is felt. When, however, an anæsthetic is necessary, and a mydriatic is not, then cocaine becomes more useful; and this condition of affairs includes all the ophthalmic surgical procedures. As stenocarpine is nearly as powerful as atropine in dilating the pupil, and as its influence continues only about half as long, it is preferable to atropine for this purpose.

It need hardly be explained that stenocarpine can be substituted for cocaine as a local anæsthetic in the numerous maladies for which a local anæsthetic is needed. If it shall be proven hereafter that in a sufficiently concentrated solution stenocarpine anæsthetizes the skin, as well as the mucous membrane, it will assume the first place as a local anæsthetic and analgesic.

It must be stated also that some subjects possess a remarkable susceptibility to the actions of stenocarpine. This fact is true also of cocaine. In a few instances, when stenocarpine has been instilled into the eyes, weakness, faintness, a cold sweat, and a rapid but feeble action of the heart have ensued, as it is so powerful. Knapp utters a caution, and advises that it be not injected into very vascular tissues.

SOLANIN.

The active principle *solanin*, although long known as a constituent of the potato in its fresh state, has received but little attention. Last year, however, DR. GENEUIL published a paper (*Bull. Gén. de Thérap.* for September, 1886) in which he ascribed very valuable anodyne and hypnotic qualities to solanin. To confirm or refute the conclusions arrived at by Dr. Geneuil, an elaborate investigation was made by Dr. Gaignard in the laboratory of the Hôpital Cochin under the direction of Dujardin-Beaumetz. We have the result now

in a paper which appears in the current issue of the *Bull. Gén. de Thérap.* of July 15th. Unfortunately, the conclusions are negative, chiefly.

Dr. Gaignard says that solanin is a glucoside, which does not combine with acids to form salts.

It is absolutely insoluble in simple water, and soluble only in strongly acidulated water.

It is highly irritating to the tissues.

It is uncertain in action, and only massive doses will produce an analgesic effect. At its best, solanin is not a useful analgesic. Moreover, it is an expensive remedy, and relatively large doses are required to produce an effect. The ordinary dose is from one to three grains, and the daily amount ranges from four to eight grains.

Solanin, it is clear, cannot be regarded as useful in itself, or as a substitute for another remedy.

EFFECTS OF HYOSCINE.

KOBERT, in a recent number of the *Archiv f. experiment. Pathol. u. Pharmacol.*, vol. xxii., narrates his experiences with hyoscine. There are two sources of this alkaloid: From the mother liquor out of which the alkaloid hyoscyamine has crystallized, and synthetically by the process of Ladenburg. The latter source is a mere matter of scientific interest. The hyoscine of the first source is an amorphous, resin-like substance, but it has all the activity of a crystallizable alkaloid. It is isomeric with atropine and hyoscyamine, and it acts like the former on the vagus, and on the heart of warm-blooded animals. It does not act on the vasomotor centre in the medulla, nor does it affect the pulse frequency. The salivary and the sweat-glands are acted on, and their secretions arrested. It paralyzes the motor-nerve apparatus of the intestine, when stimulated by muscarine.

Hyoscine acts more promptly and thoroughly on the pupil than atropine does, but the mydriatic effect is much shorter in duration. On the brain of healthy persons it has a weak narcotic property. In morbid states of the brain hyoscine is found to lessen excitement, and to bring about sleep in ten to fifteen minutes, and its hypnotic action may prove successful when chloral, the bromides, paraldehyde, and urethan have failed. It is, therefore, highly useful to calm the excitement in cases of mania, but in somatic diseases with wakefulness it is of doubtful utility. Edlefsen and Illing prescribe it when the chief indications are furnished by spasmodic cough, asthma, epilepsy, etc.

In animals hyoscine is not at all actively toxic, and in man the indications afforded by dilatation of the pupil, incoördination of movements, dryness of the throat, etc., appear long in advance of any danger.

INJECTION FOR GONORRHŒA.

DELPECH proposes the following injection for the treatment of gonorrhœa:

R.—Hydrarg. ammoniat. peptonic. . . . . . gr. $\frac{1}{20}$.
　　Aquæ destil. . . . . ℥vi.—M.

Directions for use: Take an injection morning and evening after passing urine. The first and second injection should be allowed to escape; the third one should be retained in the canal a minute or two. This procedure should be carried out twice each day—morning and evening.

MASSOTHERAPY.

Under the newly coined title massotheraphy DUJARDIN-BEAUMETZ discourses on massage (*Bull. Gén. de Thérapeutique*, July 15, 1887). He presents an interesting historical summary from Hippocrates down, showing how in this, as in so many other points of practice, our modern discoveries are only revivals of ancient usages. One of the most curious of the works referred to is that of Paullini, *Flagellum Salutis*, which, a century afterward, was republished by Meibomius (1795), under the French title which may be thus rendered: *The Utility of Flagellation in Medicine and the Pleasures of Marriage, and in the Functions of the Loins and Kidneys.* This title will recall the manner in which the Town Bull is stimulated to the performance of his public functions, as narrated in an English classic.

The physiological effects of massage are exerted on the functions of the skin, the muscular system, the circulation, the nervous system, absorption, and nutrition. As respects the skin, he refers to the mechanical displacement of the epidermic cells, and the opening of the orifices of the sebaceous and sudoriparous glands, the principal utility of the practice, which thus increases the circulation and functional activity of the cutaneous apparatus. The tone of the muscles, their contractile energy, their nutrition, are improved by the movements of which they are the subject. The increased activity of the circulation in the skin and muscles promotes oxidation and combustion, and hastens the removal of effete materials. The increase of the peripheral circulation reacts on the central apparatus, and hence there is greater activity with higher temperature of the whole body.

The effect of massage on the nervous system is twofold, consisting in pressure, friction, and elongation of nerve trunks, and in a peculiar mental state, called by Barety, whom our author quotes, *neurisation*. Now, Barety entitles his work *Animal Magnetism*, and ascribes a certain influence to "passes," thus reviving and bringing into the terms of science antiquated mesmeric jargon. If this is to be the outcome of massage, it were high time to call a halt.

On the pathological side, the usual effect of massage on local inflammatory deposits, effusions, etc., are duly set forth by Dujardin-Beaumetz.

HYPNOTISM.

The jugglery of hypnotism, and its medico-legal relations, are the subject of a recent work by GILLES DE LA TOURETTE, to which an introduction has been written by Prof. Brouardel. A French critic has well said that this subject has become "an object of commerce, transportable and lucrative," and that the "commercial travellers of hypnotism" are doing infinitely more mischief than is supposed; so much so, that the Austrian and Italian governments have forbidden the exercise of their arts. It is not a hopeful indication that the methods and terms of Mesmer are again proposed as a remedial agency. It is a fact that under the leadership of Dr. Elliotson, of London, the mesmeric trance was utilized for the production of insensibility for surgical operations, and the announcement of anæsthesia by ether, just discovered in this country, was made in the *London Medical Gazette*, under the title "Animal Magnetism Superseded." But this occurred in 1848.

Iodide of Potassium in the Broncho-pneumonia of Children.

Dr. Zinis, of Athens, Greece, in a letter which appears in a recent issue of the *Bull. Gén. de Thérapeutique*, advocates the use of iodide of potassium in the broncho-pneumonia of children, making some reservations, however, as to the form of the disease. He asserts that a perfect cure of the disease is more certainly accomplished by this than by any other remedy, especially if used early. He finds that it lowers the temperature one to two degrees, that it sensibly diminishes the cough, and calms the respiration, and that it renders the expectoration easier. He makes the reservation that the broncho-pneumonia of measles and whooping-cough is not so amenable to the action of this remedy. He finds also that the results are better when the child is vigorous, and when the age is above rather than under five years. These are important exceptions, and very much limit the utility of the remedy. It is, however, no secret in this country that small and frequently repeated doses of the iodides are of great utility in cases of capillary bronchitis.

The quantity of the remedy recommended by Dr. Zinis to be given in twenty-four hours varies, according to the age, from eight grains to a scruple, dissolved in three ounces of water.

Apropos of the use of the iodides in the bronchitis of children, M. H. Roger advises the following:

  ℞.—Syrupi amyli iodidi . . . . . . ℥iv.
    Potassii iodidi . . . . gr. xv.—M.

Before each meal a coffeespoonful of this syrup. Every morning $\frac{1}{50}$ grain granule of arseniate of soda in a cup of milk; and at each meal two ounces of raw beef and half a drachm of phosphate of lime in powder.

The Actions of the Crystallizable Veratrum Alkaloids.

Dr. Heinrich Lissauer publishes, in the last issue of the *Archiv für experimentelle Pathologie und Pharmacologie*, an elaborate research on the actions of the crystallizable veratrum alkaloids. We submit his conclusions:

These alkaloids paralyze the vasomotor apparatus, including the vasomotor centre in the medulla, and probably, also, directly the organic muscular fibre of the vessels.

They slow the action of the heart without enfeebling it, if the doses exhibited are not so large as to paralyze directly.

They affect the respiratory action, at first merely slowing and lengthening the interval, but at last complete paralysis ensues.

The movements of the peripheral muscles are affected in a similar manner.

The digestive tract is influenced variously in different animals: in some there is merely salivation; in others, nausea, vomiting, and diarrhœa.

By large doses, spasms centric in source are produced.

Temperature is affected, and without doubt in a secondary manner, through the action on the vascular apparatus and the function of assimilation.

We do not find that our author has contributed any new facts to the existing knowledge of the effects caused by the veratrum alkaloids.

The German and French Treatment of Asthma Compared.

Dr. Schlemner (*Revue de Thérapeutique*, June 15, 1887) makes a comparison between German and French therapeutical methods as applied to the treatment of asthma. As regards the reflex influences which determine attacks of asthma, especially morbid states of the nasal mucous membrane, they seem to receive more attention from German than French therapeutists.

In the treatment of the asthmatic paroxysm, both employ the inhalation of pyridine and the subcutaneous injection of morphine and cocaine. Lazarus, who has but little confidence in such remedies as paraldehyde, hyoscyamine, atropine, and quebracho, praises chloral and iodide of potassium. Whilst the French employ with success the rectal injections of sulphuretted hydrogen, there are no reports from Germany of similar experiences.

Besides the iodides and pyridine, some German authorities use, also, arsenic and lobelia. Brügelmann insists on the importance of pneumotherapy, especially when catarrh and emphysema complicate the case; Lazarus especially vaunts nitrogen and saline inhalations, and terpine; and Lublinsky advocates the treatment of the accompanying neurasthenia or constitutional states, and in this practice Boecker and other physicians coincide.

Ulexine.

Gerrard has recently separated an alkaloid from Ulex europæns, to which the name ulexine has been given. This new principle has been investigated by Mr. J. Rose Bradford, whose paper appears in the current issue of the *Journal of Physiology* for June, 1887, vol. viii. No. 2.

The hydrobromate is the salt used in these investigations. It was ascertained by experiments on frogs, that ulexine paralyzes muscles and nerve trunks, and depresses the spinal cord somewhat. In sufficient doses, it first arrests voluntary movements and the reflex actions, but the muscles continue to contract feebly on direct excitation, unless the dose be very large, when they too, are immediately poisoned. In cold-blooded animals—frogs and eels—ulexine paralyzes the vagus, and the heart is also slowed and weakened.

Ulexine acts on the respiration in a peculiar manner, and in a minute quantity, not sufficient to affect voluntary movements, causes paresis, irregularity, and slowness of respiration. In the words of our author—" with larger doses the respirations will be arrested some time before voluntary movement is paralyzed."

In mammals ulexine is a powerful respiratory poison also. Small doses caused fibrillar contractions of the muscles of a very persistent character, and at first the muscles respond with an abnormal readiness to mechanical irritation, but this stage of excitation is succeeded by paresis, and, finally, complete paralysis succeeds.

Ulexine increases the blood pressure very considerably and quickly if the amount given be small, but this rise is succeeded by a gradual fall. When a large quantity is given the rise in the blood pressure is inconsiderable, and the fall is greater and longer in duration. Mr. Bradford ascertained that there ensues a marked contraction of the kidney simultaneously with the rise in the blood pressure, and, hence, he concludes that this phenomenon is due to contraction of the arterioles.

When the vagus can no longer inhibit the heart's action, the pulsations become very rapid, but weak. The kidney contracting with the rise of pressure, it again expands with the fall. Ulexine is an active diuretic, and can best be compared with caffeine, but the latter has a more sustained influence. Our author concludes his paper with the following sentence, which is a compendious statement of the facts and a summary of his final opinions:

"Thus ulexine is an alkaloid, having a powerful and widespread action, being a nerve and muscle poison, a respiratory poison, raising arterial tension, and producing diuresis; but the respiratory action of the drug being produced by the smallest doses, seems to be the most important."

GLYCERINE AND DIABETES.

In the last issue of *The Journal of Physiology* MR. W. B. RANSOM discusses the influence of glycerine on the sugar-producing function of the liver. Weiss and Luchsinger had before demonstrated that under the action of glycerine an accumulation of glycogen took place in the liver; and, subsequently, Luchsinger and Eckhard ascertained that experimental glycosuria was sometimes prevented by the subcutaneous injection of glycerine.

After a careful investigation of the subject by experimental work, Mr. Ransom has formulated the following conclusions:

"1. That certain forms of glycosuria may be checked by glycerine.

"2. That glycerine acts more efficiently when introduced into the alimentary canal than when injected subcutaneously.

"3. That glycerine checks glycosuria by inhibiting the formation of sugar in the liver.

"4. That in this way glycerine may lead, indirectly, to an accumulation of glycogen in the liver."

Mr. Ransom holds that the production of glycogen in the liver is due to cell metabolism and not to the action of a ferment. The action of glycerine, he thinks, consists in some modification in the protoplasm of the liver-cells. He has no opinion to express as to the therapeutical value of glycerine in diabetes, and the views of clinicians are both various and conflicting. It is quite probable, the reviewer thinks, that some change in the quantity given and in the manner of giving it will place glycerine amongst the most valuable of the remedies for diabetes.

TREATMENT OF ANGINA PECTORIS.

In a recent issue of the *Revue de Thérapeutique*, we find a compendious statement of DR. HUCHARD'S opinions on the subject of cardiac diseases remediable by the iodides. In his picturesque phrase, "these are maladies that have the heart for their seat, and the arteries for their origin." The treatment by the iodides is first concerned with relieving that condition of the vessels which prevents a proper interchange between the blood and the tissues; afterward with the muscular substance (*myocarditis*). Besides these, he includes a group in which, whilst the rational signs are significant, there are no physical signs of the mitral disease. The present conception of its clinical characteristics is indicated in the title—arterial cardiopathy—which is applied to a group including the coronary arteries, the muscular substance

of the heart, and the aorta. They have these clinical characteristics in common : as expressed in the language of Huchard—"they are latent in their evolution, insidious in their origin, paroxysmal in their course, accidental and intermittent in their manifestations, sudden and destructive in their explosions of arhythmic irregularity." The heart suffers secondarily to the alterations which begin in the arterial system. It follows necessarily that to confine the treatment to the heart is to fail. It is less a cardiac medication than an arterial to which our treatment should be addressed, and this conception is as applicable to the treatment of angina pectoris as to all other diseases included within the great morbid process called *arteriosclerosis*.

HYDROQUINONE.

DR. SILVESTRINI and DR. PICCHINI, his pupil, have published (*Il Morgagni* and *Revue de Thérapeutique*, July 15, 1887) some recent observations on hydroquinone. This chinoline derivative was brought forward three years ago as a substitute for quinine, and very sanguine expectations of its therapeutical utility were entertained. Its antipyretic power was not questioned, but it was soon perceived that certain unpleasant, even dangerous conditions were induced by it. Profound depression, severe rigors, profuse sweats, so often occurred when its antipyretic powers were utilized, that very soon it ceased to be employed, and the safer antipyretics as antipyrin, acetanilide, salol, etc., substituted.

Prof. Silvestrini and his pupil have, however, arrived at different conclusions from those heretofore held, and assert that it has an immense superiority over its cogeners, in its perfect innocuousness in the strongest doses. It is prompt in action, and the higher the febrile temperature, the more powerful as an antipyretic. In typhoid, acute rheumatism, and erysipelas, it acts in a highly efficient manner; and besides abating the temperature of fever, it has the power to remove the attendant symptoms—the disturbances of pulse and of respiration, the elimination of urea, the blood pressure, etc.

Hydroquinone is not irritant, and any gastro-intestinal trouble present is not increased by it. Having the antiseptic and germicide powers belonging to the group, when introduced into the intestinal canal it arrests the process of fermentation by inhibiting the microbes necessary to the process.

The dose of hydroquinone ranges from five to thirty grains, the frequency of administration determining to some extent. It is freely soluble in water, and unirritating, and hence can be given hypodermatically.

MERCURIAL PARALYSIS.

An elaborate research, pathological and clinical, is being published, on the nature and site of mercurial paralysis, by M. MAURICE LETULLE in the *Archives de Physiologie, Normale et Pathologique* for 1887. This study is in continuation of the valuable observations of Küssmaul and those of Hallopeau, and is reinforced by the large field of clinical investigation furnished by the great quicksilver mines of Almaden.

In the study of mercurial trembling, a symptom that has always attracted much attention, our author finds that the muscles of the extremities are often feeble although trembling has not occurred, and that the muscular weakness

up to the period of paralysis is not accompanied by atrophic degeneration. The electrical reactions, when the paralysis is partial, remain normal. The tendon reflexes do not disappear, but they become feeble. Disorders of sensibility (dysæsthesia) accompany the other phenomena—of the upper extremity constantly, and in one-half, only, of the lower. In somewhat more than one-half the special senses were affected, and were bilateral. The pain experienced, was felt in the areas subsequently paralyzed.

Notwithstanding appetite and digestion remain unimpaired, loss of flesh goes on steadily; degenerative changes having many of the characteristics of senility occur; the teeth darken and become even black, their surface roughened and crossed by deep lines of erosion, and grow more and more carious.

As regards the pathological changes in the nervous system, our author finds that the distinctive characteristic is the action of mercury on the myeline; there is no change of an inflammatory kind, and the chemical alteration consists in a disintegration and disappearance of the fatty constituents of the nerve elements.

METHYLAL.

Methyl alcohol is the source of the new local anæsthetic. It is neutral, volatile, has an ethereal odor, and a pungent taste. An investigation of methylal has recently been made by Motrochin, in the laboratory of PROF. ANREPS (*Vratch*, No. x., 1887, and *Bull. Gén. de Thérap.*, July 15, 1887). The study includes observations on animals and on man.

The inhalation of methylal vapor causes drowsiness and sleep, but when the inhalation is stopped, the sleep ends. During the time of its action, the sense of pain is abolished. Respiration is slowed somewhat, but also deepened, and there is no alteration of its rhythm. The heart remains unaffected.

The subcutaneous injection of methylal induces more or less anæsthesia, but it is short in duration. Reflex action is lessened, or it may be suspended entirely if a sufficient quantity is administered. The excitability of the psycho-motor centres is much diminished when the remedy is injected subcutaneously or inhaled, but this effect is transient. Methylal antagonizes to some extent the actions of strychnine and picrotoxin.

The inhalation, and stomachal administration, are by far better modes of giving it than by subcutaneous injection. It acts favorably on man, and in a moderate dose produces a decided anæsthesia, especially of the head and face, and more or less vertigo.

It is obvious from these facts that methylal has properties and powers very similar to those of paraldehyde, and may be prescribed in all morbid states to which the latter has been considered adapted.

ACTION OF CALOMEL ON THE BILE.

DR. J. ZAWADZKY (*Vratch*, 1887, quoted by the *Bull. Gén. de Thérap.*, July 15, 1887) presents certain conclusions at which he has arrived after a long, faithful, and conscientious study of the subject, the influence of calomel on the decomposition of the bile.

He finds that calomel has the property to prevent the decomposition of bile after it has entered the duodenum. The characteristic calomel stools, he ex-

plains by the transformation of bilirubine into biliverdine in the presence of Hg_2O (corrosive sublimate) into which calomel is, in part at least, converted, after entering the intestine. From this point of view, then, the so-called calomel stools are not the result of a cholagogue action.

Calomel as a Diuretic.

M. Jendrássik reports (*Deutsches Archiv für klin. Med.*, 1886) the results obtained from the combined action of calomel and jalap—from two to four grains, of each, three or four times a day. From the second to the fourth day the diuresis begins, and is very active, the amount of urine surpassing the diuretic action of digitalis. The quantity of urine voided increased for several days, and after the maximum, gradually lessens to the normal. By this time mercurial salivation has occurred to some extent, but less than if the jalap had not been given. It is asserted by Jendrássik that any purgative action lessens the diuretic.

In attempting to explain the action, he makes no mention of the resin of jalap, which is a stimulating diuretic of considerable power, nor does he refer to the reflex influence proceeding from the intestine.

MEDICINE.

UNDER THE CHARGE OF

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The Value of Sudoral Eruptions as a Prognostic Sign in Typhoid.

Lacaze (*Revue de Médecine*, 1887, p. 270), after a definition of sudamina and miliaria, and numerous extracts from the literature of the subject, concludes that the sudaminal eruptions which appear before the commencement of the second week of typhoid fever have no value in determining the duration or the prognosis of the malady; while those coming after the second week, during the doubtful period, are almost always the sign of the commencement of full convalescence.

On a Method of Prophylaxis and an Investigation into the Nature of the Contagion of Scarlet Fever.

Jamieson and Edington (*British Medical Journal*, 1887, 1, 1262) publish a valuable article on this subject, accompanied by a colored plate. It is acknowledged that scarlet fever is but little communicable in its early stages, and that the exhalations from the mouth, and the flakes of skin, contain the

active contagium. Jamieson has previously expressed the view that it is probably a parasitic organism, and that when inhaled or swallowed, it finally, in the course of the disease, reaches the skin from the blood, and, ripening there, is ready for immediate multiplication in the body of some other individual. In accordance with this theory, he endeavored to prove by experiment that it is possible to prevent the spread of the disease even to persons in close contact with the patient. For this purpose he made frequent applications to the throat of a strong solution of borax in glycerine; while to disinfect the skin, warm baths were employed every night from the beginning, and a mixture of carbolic acid, 30 grains; thymol, 10 grains; vaseline, 1 drachm; simple ointment, 2 ounces, was rubbed over the entire body night and morning. In this way, he reasoned, the scales would never become contagious.

The experience of the last three years completely bears out the correctness of this opinion. He reports a series of cases going to prove that the treatment mentioned decidedly lessens the danger of the spread of the disease. He also quotes some cases to show that the late desquamation contains the contagium in the largest amount; indicating that air is necessary for its maturation, since it is then that the cuticle is more fully separated, dried, and oxygenated.

The following lines of investigation were now to be carried out:

1. To discover the organism on which the virulence of the epithelial flakes depends.

2. To ascertain at what period it first appears.

3. To determine whether the clinical methods employed as described for neutralizing the contagiousness of scarlet fever are actually capable of killing it.

This, the bacterial part of the investigation, was carried out by Edington. He details the very careful methods of research adopted, with the numerous precautions taken. He could find no microbes in the epithelial scales themselves, and it is probable that only spores are to be found here; but he describes and figures several species of bacilli and micrococci obtained in cultures from the blood and scales. Experiments show, however, that there is but one, the *bacillus scarlatinæ*, which seems to be truly pathogenic. This bacillus is 4μ in thickness, and 1.2μ–1.4μ in length; motile, and occurring in long, jointed filaments. On gelatine plates it forms points of liquefaction after several days. It rapidly liquefies Koch's jelly tubes, but with no distinct growth-formation, and develops a characteristic pellicle after the liquefaction is well advanced. In fluid broth it forms a coherent, parchment-like pellicle within four hours, which later exhibits a deep wrinkling, due to a dense network of bacillary filaments. It was found in every tube but one (this exception being a tube broken early in the experiment), if started after the end of the third week, but never before this time. It was also detected in every culture tube made from the blood, if taken before the third day of the fever. When rabbits are inoculated with it, it produces fever and an erythema, followed by a slight desquamation; and the bacilli can be reobtained from the animal's blood. The effects in guinea-pigs are similar, but the desquamation is more abundant, and the flakes thicker. In calves, the skin of the thorax becomes red, and an erythema develops; there is fever, and later desquamation.

Regarding the third question, Edington found that of seven cases in which

the treatment had been continued until the seventeenth day, the part being then wrapped in sterilized cotton-wool until the thirtieth day, and then examined for the presence of bacilli, none were present in five cases, and the cultures developed very slowly in the other two.

It seems then proven that the *bacillus scarlatinæ* is the specific cause of scarlet fever, and that the other microbes found are only concomitants. Yet one, which they call *diplococcus scarlatinæ sanguinis*, occurs very frequently with the bacillus, both in cultures from the blood and from the epithelium. It cannot as yet be definitely settled whether it modifies in any way the action of the bacillus. It is a fact that both organisms were found from the first in those cases which exhibited an extremely vivid and widespread eruption.

Hemiplegia in Children.

ABERCROMBIE (*British Medical Journal*, 1887, 1, 1323) says, that while all forms of paralysis in children were formerly grouped under the head of essential spinal paralysis, it is undoubtedly true that very many cases are due to a cerebral cause. The causes of hemiplegia in adults are hemorrhage, arterial obstruction, and tumors; and all these may be active in children. Cerebral hemorrhage in infants must be exceedingly rare. The only known causes of it are purpura hemorrhagica, the hemorrhagic diathesis, and aneurisms of the cerebral vessels; and, in a few instances, a highly vascular sarcoma has given rise to a large extravasation of blood. Meningeal and capillary hemorrhages may also occur, and it is conceivable that whooping-cough might also produce massive hemorrhage, though the author has never seen a case. Arterial obstruction from embolism due to heart disease, is occasionally met with, and it is strange that it is not oftener seen. Thrombosis may take place, brought about by previously existing disease of the vessels; syphilis probably causing hemiplegia in this way. Tumors are not uncommon, usually in the pons or crus. It must be also mentioned that tubercular meningitis not unfrequently produces unilateral paralysis.

But the author has observed some fifty cases of hemiplegia in children, only a few of which could be accounted for by any of the causes mentioned. The others may be divided into *two groups*—those which followed one of the acute infectious diseases, and a much larger group where no such cause could be assigned. In the first group hemiplegia oftenest succeeded diphtheria in the author's experience, though he has also seen it four times after measles, once after whooping-cough, and once after scarlet fever. In the second group there was evidence of congenital syphilis in four patients, and the other cases fall naturally into three classes, *i. e.*—(*a*) traumatic; (*b*) congenital; (*c*) neither traumatic nor congenital, nor due to any of the causes already described.

Traumatism during labor has undoubtedly been the cause of hemiplegia in some instances, but the author has seen only one case which was probably due to injury—that of a child who had fallen upon his head. He has also seen only four cases in which the paralysis could be called congenital. The last class of cases can only be subdivided into those occurring under two years of age, and those developing after that age. The first subdivision contains essentially the cases of infantile cerebral paralysis, and the author has the notes of fourteen of them, ten of which were in girls. The intellect was

usually much below par. In the second subdivision he has seen but four cases, two of them after epilepsy.

To sum up briefly the symptoms of hemiplegia in children: it usually attacks those under one year of age, commencing with a prolonged convulsion lasting hours or days. When the fit passes, the child is found to have lost its reason or speech, or both, and to be paralyzed on one side. Sensation is rarely affected; a little improvement may follow, especially in the leg. The paralysis may come on after one of the acute infectious diseases, or as a result of syphilis, but often no cause can be found.

The pathological conditions present are nearly always the same, viz., a sclerosis and atrophy of the convolutions in the motor area of the affected hemisphere, with thickening and opacity of the meninges. Various theories have been held concerning the production of the disease. Strümpell believes the cause to be polio-encephalitis, but this view demands further proof. The occurrence of capillary hemorrhage is advocated by Eustace Smith; while Goodhart believes that the convulsions produce cerebral congestion and then meningeal hemorrhage which gives rise to the paralysis. But the objection to these theories of hemorrhage is, that there should be no tendency for the effusion of blood to affect one part of the brain more than another, and the lesion in this disease is localized. Gower's theory is that it is due to thrombosis of the veins and sinuses occurring in debilitated conditions, or after blows on the head; while Goodhart admits that embolism is the probable cause after the exanthemata. The author believes that embolism is the principal cause of hemiplegia in children. The autopsies of some of his cases prove this, and he sees nothing in the symptoms of the other cases following the exanthemata incompatible with this view. In the syphilitic cases, too, the cause may have easily been arterial obstruction from the thickening of the vessels by disease; and the identity of the symptoms in the remaining cases renders the presence of arterial obstruction a probable explanation of them also. Moreover, the limitation of the lesion chiefly to the region supplied by the middle cerebral artery is another argument for the causal agency of embolism. In the congenital cases the pathological conditions are often more extreme than in the acquired forms. Frequently entire portions of the brain are wanting.

The diagnosis of the disease from infantile spinal paralysis is easy, from the fact that it is unilateral, and that the affected limbs are not flaccid, wasted, or cold, as in the latter disease.

The prognosis, *quoad vitam*, is good. The leg usually improves considerably; the arm to a less degree.

The treatment during the convulsion must be by warm or cold baths, as indicated by the bodily temperature. All possible sources of reflex irritation must be sought after and removed. A blister behind the ears of the side opposite that of the convulsed limbs would do no harm. Bleeding should be avoided, unless, perhaps, in a traumatic case where meningitis is suspected. After the convulsion a course of potassium iodide and alkalies, with faradization, may be commenced.

Periodic Paralysis.

Cousot (*Rev. de Méd.*, 1887, No. 3, p. 190) gives a detailed account of five cases of periodic paralysis, and adds the notes of four others gathered from

the literature. Two of these, published by Westphal and Hartwig respectively, can be classified with his own; but the others seem to be of an entirely different nature, and probably belong to the class of paralyses due to malaria, which are quite distinct from the genuine periodic spinal paralysis, according to the author's definition.

The affection consists in attacks of paralysis occurring at intervals variable for different cases, though usually showing some regularity in any given case. They may appear daily, every few days, every week, etc. The degree of the paralysis varies even in the same person, sometimes being slight, sometimes absolute. The extent also varies in a similar manner, and at times even speech and respiration are partially involved. The attacks, which often occur in the night, are preceded by weakness in the joints, tingling, muscular pain, thirst, and perspiration. The paralysis then develops more or less rapidly, reaches a maximum lasting a variable time, and disappears by degrees. The total duration of the attacks varied in the author's cases from three to thirteen hours. The temperature is normal, the pulse but slightly, if at all, affected, and sensation and intelligence undisturbed. Profuse perspiration often attends or follows the paralysis. After the attack the muscles fully regain their power, and the general health is seen to be unimpaired. A most characteristic symptom is the temporary diminution or complete suppression of the electrical excitability in the paralyzed muscles, without any trace of the reaction of degeneration.

Concerning the cause and nature of the malady, no predisposing influence could be detected in any of the cases, and there was no history of malaria. The disease appeared in most cases in youth, and was of indefinite duration. In one case it disappeared permanently after childbirth, and in another lasted through life. Heredity seems to play some part in its production, as all of the author's cases were members of one family.

There appears to be no other disease with which it can be easily confounded, or to whose domain it can be assigned. The author believes the paralysis to be one of *inhibition*, but whether the point of departure is peripheral or central cannot be decided.

LANDRY'S PARALYSIS.

No advances have been made in the study of this disease since it was first described, while many cases of other disorders have undoubtedly been published as instances of it. MANN (*Med. Chron.*, 1887, vi. 99) reports a case coming under his observation. The patient, aged forty-eight, without syphilitic or neurotic taint, was attacked by a sensation of cold and tingling in his toes and feet, accompanied by cramp-like pain, which soon disappeared. Diminution of power in the legs and feet rapidly developed, so that in less than a week he was totally unable to walk, although he could still move his legs. At the end of a week from the onset of the disease the legs and trunk were absolutely paralyzed, and the arms involved to a great extent. Sensation was unaffected; there was no pain or tenderness; no spasm; no fever. The electrical reactions, both qualitative and quantitative, were normal; the reflexes were everywhere abolished; mastication, deglutition, and respiration were undisturbed. A large amount of albumen was found in the urine. On the next day the arms were totally paralyzed, and some embarrassment of

respiration was observed. This latter symptom became better, but returned on the same day, and the patient died apparently from asphyxia, with the intellect clear.

At the autopsy no lesion could be found anywhere in the nervous system, nor did the muscles reveal any change. The liver was swollen and filled with blood; the kidneys deeply congested.

This case is an instance of typical Landry's paralysis. Viewed from a clinical standpoint it could not have been acute disease of the anterior cornua, on account of the absence of fever, the continuously progressive spread of the paralysis, and the character of the electrical reactions. It ran too rapid a course for us to take muscular atrophy into account. Multiple neuritis would have exhibited pain, tenderness, anæsthesia, and altered electrical relations. Myelitis and meningeal hemorrhage are excluded by absence of sensory and trophic disturbance, and of pain in the back and spasm respectively. We are limited then to one of two inferences; either there was some lesion of the gray matter too fine to be detected by our methods of research, or some toxic influence was at work. The first hypothesis cannot be entertained in the presence of a paralysis so widespread as this. We must then accept the second, that by some selective toxic agency the nerve molecules in some part of the motor tract were deprived of their potential energy. This was the view of Landry, Westphal, and others.

Two questions now arise: first, as to the nature and origin of the poison; and, second, on what part of the motor tract does it act. It is more than probable that substances closely resembling the cadaveric alkaloids may be formed in the body during life, under the influence of certain morbid processes; and this without the intervention of microörganisms. These substances may act poisonously on the nervous system, just as we see many of the vegetable alkaloids exercising a selective power as to the part of the nervous tissue attacked. The author examined the blood for ptomaines after the patient's death, but failed to find any. This, however, is no proof of the absence of the poison, since great difficulties attend the investigation, and many of the alkaloids of this class are very unstable.

The second question, regarding the localization of the inhibitory influence, is a matter of inference only. It seems most likely that it is exerted on the gray matter of the anterior cornua, at the termination of the upper segment of the spinal motor path, not on the ganglionic cells. Why the paralysis almost invariably appears in the lower extremities first is difficult to understand; but the author attempts to explain it on the ground that the assumed toxic agency interferes with the conduction of the motor impulses from the cortex through the cord, and these consequently first fail to reach the more distant lower extremities, since the absorption of energy is proportionate to the amount of inhibited tissue through which the motor impulses must pass. It is on this account that the invasion of the disease is almost imperceptible; but as the inhibitory influence increases in power the paralysis travels upward.

The absence of bulbar symptoms was a peculiar feature in the author's case, and one not easily explained.

The Hereditary Chorea of Adults (Huntington's Chorea).

Huber (*Virchow's Archiv*, Bd. cviii. H. 2, 267–286) reports a series of cases of this excessively rare disease. According to the definition of Huntington, who first described it, hereditary chorea is characterized as follows: 1. It is inheritable, and there are whole families afflicted by it. If a generation once escapes, the power of the disease is lost, and it does not appear in the family again. 2. It begins as an ordinary chorea, increases to the greatest degree, often leads to mental derangement with suicidal impulse, and finally ends in death. No case of recovery has been observed. 3. It begins usually between the ages of thirty and forty years; seldom beyond this, and never in youth.

The first case was that of a man seen in the Zurich clinic in 1886. He was thirty-eight years of age, and exhibited choreic movements of great intensity and extent, perfectly incoördinated, and almost universal, although not nearly so violent in the legs as in the arms and head. Even the tongue and the soft palate frequently underwent involuntary movements. There was no evidence of paralysis anywhere, or of any alteration of sensation; and the electrical reaction and the reflexes were normal. The speech was interrupted, slightly nasal, and indistinct, as though the patient had something in his mouth. Prescribed movements with the arms and hands were performed with surprising certainty, and the choreic motions almost disappeared for the time; the handwriting, however, showed that voluntary control over the hands was not complete. He walked with difficulty. The disease began eight years ago with twitching of the eyelids, then of the mouth, and within a year, of the shoulders, head, and arms. For the first six years there was scarcely any disturbance of motion in the legs; and six months ago he could speak perfectly well. On investigation it was found that the sister, father, two paternal uncles, and an aunt, and the paternal grandfather and great-grandfather were affected by the same disease. In another branch of the family, descended from this same great-grandfather, there was a second cousin of the patient, together with his father, who suffered from chorea, developing late in life. The author was unable to learn anything regarding the mother of this father last mentioned (*i. e.*, the daughter of the choreic great-grandparent), but it is certainly possible that she had chorea; and the law of Huntington concerning heredity is therefore not broken. In that branch of the family the disease was not so pronounced as in the case described; but in the sister of this patient —whom, also, the author was fortunate enough to see—it was very typical. Here the patient, aged forty-two, had commenced thirteen years before to be somewhat slow both in body and mind, forgetful, and listless. After six years, choreic movements began in the shoulders, and in two years became almost universal, while some affection of the speech had developed. When examined in 1886, she exhibited even more pronounced movements than her brother; her face had a rather stupid expression, and she was totally unable to speak; she could not extrude the tongue, and this organ was decidedly hypertrophied and was in continual motion. In this case, too, intended movements were performed very well, and the chorea diminished temporarily. The legs were much less affected than the arms. The patient died later. Her daughter was below average intelligence, but was only ten years of age and chorea had not yet developed.

Huber was able to learn of the father that he had died in an asylum, the diagnosis being chorea and imbecility. His disease began in his forty-fifth year with choreic motions, which gradually grew worse, and were associated with unintelligible speech and increasing weakness of intellect. At times he suffered from attacks of mania resembling those of epilepsy. Toward the end of life the imbecility became extreme, and the movements almost ceased.

He thinks the name chorea must certainly be applied to these cases, although the two which he himself observed differed in some respects from the ordinary form, especially in that with intended movements the choreic became very slight or even ceased. And in all the cases included in this report the disease first manifested itself in adult life. It could not be learned that the chorea of childhood had ever occurred in the family.

The Pathogenesis and Treatment of Diabetic Coma.

Lepine (*Rev. de Méd.*, No. 3, 224) does not believe that either acetone or diacetic acid is the cause of the coma occurring in the course of diabetes, but considers it due to lessened alkalinity of the blood. Stadelmann determined that there was an acid actually produced in diabetes, by which the blood's alkalinity was diminished. This he found in the urine and believed to be crotonic acid, although later researches by others have shown it to be β-oxybutyric acid. He, therefore, treated his cases with large doses of bicarbonate of soda, administering even as much as 100 grm. per diem. If coma had already developed, he recommended large intravenous injections. Although Wolpe followed this plan of treatment without success, Lepine attempted it in one instance, and reports the details of his experiment. In a very severe case of diabetes, in which coma had already developed with a temperature of 96° F., he injected into the median cephalic vein 1.5 litres of water at 104° containing 8 grm. of sodium chloride and 34 grm. of sodium bicarbonate. The temperature immediately rose to 97.5° and the coma became less profound. Twelve hours later he administered a second injection, just before which the blood was found to be nearly neutral, and shortly after which the urine was very decidedly acid but contained no glucose. Again there was temporary improvement, but the patient died some hours later. From the condition of the urine and the blood it is evident that some acid existed in the economy capable of neutralizing an enormous quantity of alkali. Lepine does not think that the combination of this acid with a base is the object to be attained in giving alkaline injections, for the salts produced are also poisonous. The introduction of soda into the economy acts rather as favoring the destruction and elimination of the poisonous acid. We should, therefore, begin the treatment as early as possible in grave cases, in order to prevent the formation of the acid. An exclusive diet of meat is to be avoided in diabetes, since it is in cases receiving this diet that coma is especially liable to develop.

Contribution to the Diabetic Dyscrasia.

In connection with the article just mentioned, that by Hugounenq (*Rev. de Méd.*, 1887, p. 30) is of interest. This author had the opportunity of studying a case dying with diabetic coma. He examined—1. The urine of the patient before any treatment was instituted. 2. The blood; drawn before a solution

of forty-four grains of bicarbonate of soda was injected into the veins. 3. The urine after this injection. In the first specimen he found β-oxybutyric acid in addition to sugar. In the second specimen, the blood, he found the same acid. The third specimen contained neither the acid nor sugar. In an effort to explain these facts the author takes up the chemical relationship of glucose to some of its derivatives. β-oxybutyric acid is the homologous superior of lactic acid of the muscles. Its formation at the expense of diseased tissue is no more remarkable, then, than the production of the latter acid in the wearied muscle. Diacetic acid is but a further oxidation, and is, in fact, found in the urine with β-oxybutyric acid. Diacetic acid is, however, very unstable, and readily changes into acetone, the last of the series. By just what process in the living body sugar is converted into β-oxybutyric acid, and thus the chain from glucose to acetone completed, is not understood. Outside of the body there is a simple method by which the change may be brought about; the glucose becoming alcohol, aldehyde, and then aldol, before it reaches the condition of β-oxybutyric acid. The same result is certainly attained ultimately in the body, whatever the method may be.

These studies show us how, in the diabetic dyscrasia, glucose or the various compounds derived from it, leave the body before being completely consumed into water and carbonic dioxide, as is the case in health. Thus the organism loses the heat of their combustion; a part of the chemical energy from which it draws its strength. Rational therapeutics teaches us then to attempt to consume these substances in the economy. As the reaction described proves, this can be very well accomplished by means of alkali, and this plan of treatment should not be neglected.

PARENCHYMATOUS MYOSITIS.

Several interesting accounts of cases of this little known disease have recently appeared in the German medical press. HEPP (*Berliner klin. Wochenschrift*, 1887, No. 17, 297, and No. 18, 322) reports a form of acute parenchymatous myositis which he entitles "Pseudo-trichinosis." It is an exceedingly rare affection, and but two cases, he states, are to be found in the literature which can be classified with it. It consists of an acute parenchymatous inflammation of nearly all the skeletal muscles; seeming to be an independent disease, but probably of an infectious nature, although no cause can be found for it. It presents in its symptoms the greatest similarity to trichinosis, and may, like it, cause death.

The case in question was that of a woman, aged thirty-six, who after feeling not quite well for some weeks, was suddenly attacked by angina and an exanthem. Both disappeared soon, but eight days later progressively increasing pain, swelling, and stiffness of the muscles developed. When admitted to the hospital about two months after the first symptoms had made their appearance, she lay helpless on her back in bed. The face about the eyelids, and the limbs except the hands and feet, exhibited a peculiar hard œdema which pitted with difficulty, and which transformed the arms into firm, cylindrical, swollen masses. The affected muscles everywhere were in a permanently stiff, contracted condition, without elasticity. There was no tenderness or pain when at rest or on limited passive motion, but more extended movement

caused great suffering. The patient was unable to lift her head from the pillow, and could scarcely move her arms; while her legs were in not much better condition. The fingers, feet, and toes could, however, be moved with ease. The muscles of the face did not appear to be involved, and the joints everywhere were unaffected; the tendon reflexes were abolished, and the electrical excitability diminished. None of the inner organs gave evidence of disease, but the urine contained considerable albumen.

Her condition while in the hospital grew steadily worse. Cramp-like pain, increased swelling of the skin, still less power of motion, a nasal voice, cough with great difficulty in expectoration, trouble in swallowing, and great tenderness and hyperæsthesia were noticed; there was more or less fever, and much weakness. The difficulty in swallowing grew worse, and attacks of suffocation intervened, in one of which she died, eleven days after admission and in the eleventh week of the disease.

The autopsy revealed a widespread degeneration of all the striated muscles except the heart, diaphragm, and the muscles of the orbit. Macroscopically they were pale, yellowish, saturated with fluid, easily torn, and resembling in appearance the flesh of rabbits or fish. Microscopically a hyaline degeneration became visible, having produced in some places entire destruction of the contractile substance. There was virtually no small-celled infiltration, and the process had evidently taken place in the muscle fibre itself. There was no fatty or granular degeneration, as in trichinosis.

The author feels justified in calling this a case of acute parenchymatous myositis. The disease may be distinguished from multiple neuritis by the limitation of the pain to the muscles, their peculiar consistence and stiffness, and the unusual hardness of the œdema. Œdema of this type is met with in different varieties of myositis, as the syphilitic, rheumatic, ossifying, ischæmic; sometimes in myositis attending the acute infectious diseases, including tetanus; and in trichinosis. It is of an inflammatory nature, while that seen in neuropathic paralysis is vasomotor in origin, and is not so hard; nor is it limited to districts of inflamed muscle. Even from a purely clinical point of view this case could not have been trichinosis, for no trichinous flesh had been eaten, there had been no gastro-enteric symptoms, and the diaphragm and muscle of the eye were not involved. The angina at the outset suggested myositis following diphtheria. But there had existed no diphtheria in the family, and such a process, dependent on this disease, has never been observed.

The author then describes the two cases in the literature to which he had referred. They were reported by Potain and Marchand respectively, and both ended fatally. He claims that they were almost identical in their symptoms with his case, and must be classified with it.

In a later publication (*Ibid.*, 1887, No. 22, 389) the same author describes a case of severe parenchymatous inflammation of circumscribed muscle masses of the right gluteal region and the right upper arm, leading to amyloid degeneration with the production of fluctuating swellings without pus, and accompanied by hard, circumscribed œdema of the skin. The patient, a man of twenty-one years, fell in a violent epileptic fit, biting his tongue severely. Weakness and pain produced repeated falls on the same day, and he probably bruised his muscles considerably. His tongue became swollen

and partly covered with a diphtheritic deposit; and the author believes that through some infection from this source the severe parenchymatous inflammation of the muscles was produced, instead of the suppurative process which might have ordinarily followed the bruising.

Hepp refers to interesting cases reported by Kreiss, Giess, and Wagner. Those of the two former were likewise instances of localized parenchymatous myositis, but that of the latter must be classified with Hepp's first case.

WAGNER's case (A Case of Acute Polymyositis *Deutsches Archiv*, Bd. xl., H. 3–4, 241) was that of a woman, aged thirty-four, presenting the symptoms of tuberculosis of the left apex. She complained also of some pain and stiffness in the back, loins, neck, shoulders, and joints of the hands, together with some œdema. There was no history of taking cold. Later both arms became much swollen, the contour of the muscles disappeared, there was no pitting or tenderness on pressure. The swelling gradually diminished somewhat, and became much softer. There was no tenderness over the nerve trunks, disturbances of sensation were nowhere marked, and the electrical reactions were always normal. The cough gradually grew worse, and attacks of suffocation on attempting to swallow made their appearance, which did not seem to be commensurate with the slight degree of the tuberculous process. In one of these attacks she died, having been under observation two months.

The diagnosis had presented some difficulties. No obstruction to the circulation could be found. The painlessness of the nerve trunks with the normal electrical reactions excluded neuritis. The presence of rheumatism was possible; but the greatest likeness was to trichinosis, although the freedom from involvement of the legs and face excluded that disease. The autopsy revealed an extensive disease of the muscles throughout the body. Those of the arms were pale red, of a peculiarly stiff consistence, of a rather homogeneous appearance, saturated with serum and easily separable into fibres. Nearly all the muscles of the upper half of the body, including the intercostals and diaphragm, were more or less affected, either throughout or in spots. There was no affection of the joints. Microscopically both fatty and amyloid degenerations of the muscles were found. A small-celled infiltration was seen in parts, and a partial reformation of the fibres. The author gives a detailed description of the microscopical appearance, accompanied by several woodcuts.

He reviews carefully the various published cases which seem to him to resemble his in any particular, and concludes that his case was one of the most acute forms of progressive muscular atrophy, adducing at length his reasons for this belief.

Extreme Frequency of the Pulse after Paracentesis.

DEHIO (*St. Petersb. Med. Wochensch.*, quoted in *Lancet*, 1887, 1, 1098) reports an interesting case of paracentesis for ascites in cirrhosis of the liver. The pulse had been 86, regular, and of moderate tension. No heart disease could be detected. On the day after the operation the pulse was 162 and thready, and the patient was pale, and complained of dizziness and prostration. After five days of rapid pulse 0.002 grm. coronilin was given subcutaneously, fol-

lowed by a reduction of the pulse to 80 for a few hours only, after which it rose to 180. On the next day it again sank without the use of coronilin, to 84, and did not rise again. The patient, however, became worse, and died after eighteen days.

At the autopsy there were found fatty degeneration of the heart, general arterio-sclerosis, and some hemorrhagic pachymeningitis, with considerable clear fluid in the ventricles. Dehio considers that the anæmia of the medulla following the operation, was undoubtedly the cause of the rapid pulse. This either stimulated the accelerator or paralyzed the inhibitory centre. Extreme frequency of the heart-beat, with weak cardiac impulse, and no arhythmia, indicates, according to Nothnägel, paralysis of the inhibitory apparatus; and Traube has reported a case which he explains in a similar manner. The author believes that this is also the correct explanation in his case. It is scarcely possible, moreover, that stimulation of the accelerator apparatus should have continued so many days without any sign of fatigue of the centre. As the abdomen began to fill with fluid again, the medulla became engorged with blood, and the vagus resumed its normal functions.

THE ETIOLOGY OF ENDOCARDITIS.

FRÄNKEL and SÄNGER (*Virchow's Archiv*, B. cviii. H. 2, 286–397), while admitting that bacteriological studies of later years have shown that the most different forms of disease may depend on the same germ—tuberculosis being, perhaps, the best example of this fact—say that the same studies teach that sometimes different microörganisms may produce similar clinical symptoms. Endocarditis is a case in point, and the authors have endeavored to determine what forms of it were caused by microörganisms, and which of these bodies were the factors in each case. They report thirteen cases examined bacteriologically during the last year; detailing in full their methods of procedure, both as regards the culture of the microbes and the inoculation of the same in animals, and giving the conclusions derived from their experiments. They found eight species of microbes in all, six of which were pathogenic. In studying the cases with reference to these organisms, the authors show that there is no one variety which is the specific cause of endocarditis. Sometimes one species was found in the deposit on the endocardium, sometimes another; and in one instance three different kinds were detected. The *staphylococcus pyogenes flavus* was the one by far most frequently present. It has been proved that many species of microörganisms may be made to produce artificial endocarditis. Netter even found the pneumococcus of A. Fränkel in the vegetations of eight cases of endocarditis complicating pneumonia, and succeeded in producing endocarditis in rabbits with it.

It is worthy of note that the microbes showed such continued vitality in some of the authors' cases, where the affection of the endocardium was certainly very old. This may explain the tendency so often observed toward a recurrence of endocarditis. Yet their vitality is not unlimited, and the negative bacteriological results of some of the cases may have been due to the death and disappearance of the bacteria formerly present. They believe with Weichselbaum, Klebs, and Köster, that verrucose as well as ulcerative endocarditis is a disease of purely mycotic origin, and think that the two forms

should not be separated etiologically. But as they have noticed repeatedly that the microbes are far less abundant in the verrucose forms, they believe that the number present may have some influence in determining the type of the disease.

Atheromatous endocarditis is the only kind which is certainly non-mycotic. The true nature of the so-called fibrous, sclerotic, chronic variety is doubtful. It seems not improbable that it is frequently only the terminal stage of a verrucose endocarditis, and hence is of mycotic origin.

It is a remarkable fact that coagulation-necrosis is the lesion usually observed on the valves, and that true suppuration so rarely occurs, although the pyogenic staphylococci are the ones usually present. This may be due to some peculiarity of the bloodvessel supply, for it has been noticed in some cases that while the valves have become coagulation-necrotic, abscesses have developed in the heart muscle. On the other hand, the presence of some other microbe with the staphylococci may in some way modify the action of the latter. The authors agree with Orth that the bacteria are usually deposited directly on the valves from the blood current; but believe, too, that in some cases they may reach their destination through the coronary arteries. Regarding the question, whence and how the microbes gain access to the valves, it is interesting to note that in seven of the cases reported suppuration was going on somewhere in the body.

That the left side of the heart is the one usually attacked, may be due, as Virchow supposes, to the greater blood-pressure forcing the bacteria between the endothelial cells. The authors are, however, inclined to the view that it is because the microbes develop better in the oxygenated blood of the left heart, since, as Liborious has shown, oxygen is necessary for their vital activity.

Contribution to the Determination of the Percussion Limits of the Stomach.

PACANOWSKI (*Deutsche Arch. f. klin Med.*, B. xl. H. 3 and 4, 342), in speaking of the limitations to the physical examination of the stomach, says that Penzoldt's method for determining its boundaries by pouring in water through the sound, and then outlining the position of the dulness, is accurate but unpleasant, and dangerous if ulcer be present. The same is true of Leube's process of feeling for the end of the sound through the abdominal and gastric walls. Rosenbach's and Schreiber's methods are too complicated for ordinary use. Frerichs's device of dilating the stomach with carbonic dioxide, and then percussing, is not accurate, and may be attended by danger.

The author has examined eighty-one cases (fifty-five men and twenty-six women) by simple percussion; sometimes two to three hours after the chief meal, sometimes when no food had been taken, and has corroborated his results in many cases by employing Penzoldt's method. Of the four boundaries to be determined, the lower is the most important for practical purposes. The others vary but little, except when artificially distended with carbonic dioxide; and to determine them the patient was always examined while upon his back. The lower part of the right border can scarcely be determined by simple percussion, since it lies below the edge of the liver, and to the right of the middle line. When, however, the viscus is artificially dilated with gas,

the difference between the sound of this part of the stomach and that of the adjacent colon can be often distinguished. The upper part of the right border is very easily determined by ordinary percussion. The left boundary cannot be located with certainty. The upper border is partially covered by the lung, hence deep percussion shows us the actual upper limit of the stomach, while light percussion reveals the portion not at all covered by pulmonary tissue. The first of these reached, as a rule, the lower edge of the fifth rib, or the fifth interspace in the left parasternal line; the fifth interspace or the lower edge of the sixth rib in the left mamillary line, and the lower margin of the seventh rib, or upon the eighth rib in the left anterior axillary line. To determine the lower border of the stomach, the author first examined the patient while recumbent, in order to discover whether the organ could be distinguished from the colon. Its percussion tone is more tympanitic and duller than that of the large intestine, and frequently varies slightly with respiration. He now let the patient stand, administered a half litre of water, and sought for a line of percussion dulness, which would disappear when the patient again assumed the recumbent position. This line marked the lower border. There are some difficulties with this plan, viz., that on standing, the whole gastric region often becomes dull, owing to the unavoidable tension of the abdominal walls. Yet the dulness of the water in the viscus can, as a rule, be detected if care be used. The author further employed Frerichs's method in all cases, excepting those in which there was heart disease, or a gastric ulcer was suspected. Too great distention must not be allowed, or the true boundaries become displaced, and false results are obtained. He locates the lower border of the stomach at a distance above the navel in the parasternal line of 3–5 centimetres in men, 4–7 centimetres in women. He has never seen it extend below the navel. In his own cases he found the stomach to be 7 to 20 centimetres in height in men, the average being 11–14 centimetres. In women, it varied from 7 to 13, with an average of 10 centimetres. The breadth in men was usually 21 centimetres, the maximum being 25, the minimum 16. In women it varies from 15 to 22, the average being 18 centimetres. Thus the relation of the height to the breadth in men is 1 : 1.5 or 2, and in women about 1 : 2.

DYSENTERY, AND THE METEOROLOGICAL CONDITIONS INFLUENCING IT.

HIPPIUS (*Deutsches Archiv f. klin. Med.*, Bd. xl., H. 3 und 4, 284) publishes an elaborate article on this subject with six tables, five of which contain graphic curves showing the relation of the daily number of cases of dysentery during five years to various meteorological conditions. His observations are founded on 2507 cases treated at the St. Wladimir Children's Hospital in Moscow. The sixth table gives two curves comparing the number of cases of dysentery with that of catarrh of the stomach and small intestine taken together, and showing that they are almost parallel.

The conclusions drawn from his tables are:

1. Either continued elevation of the temperature of the air, or a sudden cooling of the same, increases the number of cases of dysentery.

2. Dysentery begins in spring when the temperature exceeds 50° F., but may continue into autumn even when the meteorological conditions are not favorable to its existence.

3. Dampness of the air is favorable to the development of the disease. The number of cases in hot weather increases if there is a sudden increase of humidity, and especially if there is a simultaneous diminution in the temperature of the air.

4. The injurious influence of these sudden variations in temperature and humidity is more noticeable in the first half of the summer than in the second.

5. Very cloudy weather, high winds, and a large amount of ozone in the atmosphere are rather unfavorable to the development of dysentery, but their influence is only secondary.

6. Barometrical pressure, the amount of rain-fall, the number of rainy days, and the number of thunder storms have no influence on the disease.

The maximum age of the patients whom he examined was about twelve years. In the beginning of summer two-thirds of the cases were under two years of age, but in August and September the greater number were older than this. He is of the opinion that epidemic and sporadic dysentery are identical, and that every case must be considered of a contagious nature; though in just what way sporadic cases become thus infectious cannot as yet be explained.

Functional Diseases of the Liver.

Fenwick (*Lancet*, 1887, i. 1171, 1217, 1271) has for years been endeavoring to determine whether any of the secretions would show how completely the hepatic functions were being performed ; and has discovered, he believes, that the amount of the sulphocyanide in the saliva might be taken as the index of the activity of the liver.

Specimens of the saliva mixed with a solution of the perchloride of iron produced blood-red tints of varying intensity, depending on the amount of sulphocyanide present.

These tints were compared with a scale of colors which the author had had prepared, or with a series of solutions of the sulphocyanide of iron of known strengths, varying in both directions from a shade called " normal "—this shade being obtained by the examination of the saliva of a large number of healthy persons. In this way he made thousands of examinations, and compared the amount of sulphocyanide with the symptoms of each case.

In health there was comparatively little variation, the saliva of females giving a shade oftener slightly below than above the normal color. In typhoid fever the amount of sulphocyanide was greatly diminished; increasing suddenly when the temperature fell and convalescence began. Sometimes the increase became evident a week before the fever disappeared, and constituted a valuable prognostic sign. Instances of other diseases are also quoted to show that when there was a gain in weight and strength, with greater activity of the digestive organs, the amount of the salt was increased; but that it was diminished if emaciation was progressing. The sudden change from an abundant to a scanty secretion in any disease where a drain was made upon the organism—as in chronic nephritis—indicated the commencement of failing strength and health—*i. e.*, the expenditure was exceeding the income of the system.

This change is best explained by supposing an alteration from a condition of overstimulation to one of depression of the digestive organs.

Inquiry into the state of the salivary salt in diseases of these organs where no demand was made on them for special exertion (as is the case in wasting diseases) showed a positive relation of the quantity of the salt to the condition of the digestive tract. In atonic dyspepsia, and in chronic diarrhœa and dysentery the sulphocyanide was decidedly diminished; and in cancer of the stomach this was very early the case, before cachexia and emaciation had begun. In some cases of ascites from cirrhosis of the liver it was much below normal; rising at once and very greatly after tapping. This rise was probably due to the relief of the pressure on the portal vessels and of the passive congestion of the digestive organs. It was not due to impaired digestion itself; for in cases of ascites where the stomach also was disordered, tapping produced no improvement in the amount of sulphocyanide. In jaundice the salt was very deficient, and Fenwick thinks it probable that bile must enter the intestine in order that sulphocyanide be secreted. Acute congestion of the liver exhibited augmented secretion. In chronic congestion following cardiac dilatation or mitral disease the amount was diminished, but when steady improvement in the symptoms took place a weekly increase in the quantity of the salt was observed. As regards other diseases, there was a striking augmentation of the sulphocyanide in acute rheumatism, but none in chorea. In gout and urticaria the secretion was above normal. Headache, especially of the bilious variety, was very common in persons exhibiting an increase of the salt; while in headache of a purely neuralgic nature the quantity was usually diminished. A great excess of it in old people was sometimes the precursor of grave changes in the vascular system.

Fenwick claims that the origin of the sulphocyanide is plainly connected with the exercise of the nutritive functions. Its relations to ascites, and its diminution in jaundice show that it is not due simply to chemical changes the result of gastric digestion. Lead is said to be directly depressant to the action of the liver; and it is a remarkable fact that in every case of lead colic which the author examined the sulphocyanide was absent from the saliva. The same circumstances tending to promote a free secretion of bile are accompanied by a free secretion of the salivary salt; and the author concludes that its presence in the saliva is connected with the action of the hepatic cell. He believes that it is formed from one of the constituents of the bile—the taurocholate of soda—after it has reached the duodenum. But the formation of the taurocholate of soda depends on a full supply and digestion of albuminous food; for it is probably developed from peptones after they have been absorbed from the intestines. Hence the sulphocyanide is dependent primarily on the action of the other organs of digestion as well as on the hepatic cell, though we are justified in taking its amount as the index of the action of the liver especially.

So far as therapeutic indications are concerned, Fenwick advises that the use of alcohol be stopped, and the amount of albuminous and fatty food diminished when the salivary salt is abnormally abundant. In the reverse condition tonics and a liberal diet are to be employed. Lead is the only drug capable of directly diminishing the amount of sulphocyanide, though other

substances affect indirectly.   Cod liver oil seems especially efficacious in increasing the quantity.

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On a Peculiar Occurrence of White, Clay-colored Stools.

Under this title PEL (*Centralb. f. klin. Med.*, 1887, No. 17, 297) writes that the brown color of the normal feces is due to two factors; 1st. Decomposed biliary matters, and 2d. The nature of the food taken. Under pathological conditions or after certain medicines the natural color may be altered. White, clay-colored stools have always been considered absolutely characteristic of complete obstruction of the ductus choledochus, with the consequent total absence of bile from the intestines; the feces containing undigested fat. The author reports a case in which typical clay-colored passages occurred without any such obstruction. The patient had a history of attacks of biliary colic, and at the time of examination there were icterus, enlargement of the liver, urine containing bile, and the typical stools referred to. In a few days the icterus and biliary urine had disappeared; some enlargement of the liver remaining. During four months the patient had several light attacks of colic from gall-stone; and three times exhibited slight icterus for a few days. During the whole time there was not the slightest change in the character of the stools, which were always white and clay-colored in spite of a mixed diet containing comparatively little fat. The cause of this peculiar condition was a question of great interest. There was certainly no degeneration of the liver cells, for the patient was in excellent general health. That icterus and biliary urine had existed, and that the passages had no unusually unpleasant odor proved that the bile was not lacking in some important constituents (as in the *bile incolore* of Ritter and Charcot). Careful chemical and spectroscopic examination showed that the bile *in toto* and in sufficient quantity had entered the intestine. Perhaps in this case it was transformed chiefly into chromogen instead of into urobilin as under normal conditions.

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Cause of the Red Color of Non-saccharine Urine on adding Picric Acid and Potash.

In view of the extended use of picric acid as a test both for albumin and glucose, it is well to be aware of the fact that a saturated watery solution of this reagent produces in normal human urine a precipitate, which, according to JAFFE (*Zeitschr. f. physiol. Chemie*, vol. x. p. 391) consists of uric acid crystals, and of fine needles of creatinine-potassium picrate. The picric acid, it is said, precipitates uric acid even more completely than hydrochloric acid. Furthermore, if to a solution of creatinine a little picric acid solution and then a few drops of a solution of caustic soda or potash be added, the mixture will assume at once, and in the cold, a beautiful red color, which is turned yellow by acetic or nitric acids. This reaction (which all who have employed the picric acid test for glucose must have noticed) can be obtained in a solution of 1:5000, and is, therefore, directly applicable to the urine. Acetone gives a similar reaction, but the red color has a yellow shade. Creatine gives a yellow color at once, which only gradually changes to red. Other bodies—such as glucose and uric acid—give the red, *but only on heating.*

Two New Pathological Coloring Matters in Urine.

In a patient suffering from osteomalacia, cystitis, and nephritis, LEUBE (*Archiv f. path. Anat.*) observed that the urine became of a dark violet or almost black color on being exposed to the air. The (amorphous) coloring matter is soluble in ether, from which it can be extracted by dilute alkalies, but not by acids. The alkaline solution is at first brownish-red, and, later, yellow. It is soluble in hot water, chloroform, benzol, etc.

In the urine of a woman afflicted with malignant hepatic disease, THORMALEN (*Virchow's Archiv*, vol. cviii. p. 317) observed in using the sodium nitroprusside and caustic soda test an unusual reaction. The primary red color, namely, on the addition of acetic acid neither became lighter, nor changed to crimson (acetone), but turned a beautiful blue, which became red and blue again alternately on adding an alkali or acid. He found the coloring matter causing this reaction to occur normally in the urine of horses and cats, from which it can be separated by the action of plumbic acetate.

Cause of the Development of Sulphuretted Hydrogen in Urine.

Under pathological conditions it sometimes occurs that the urine while still in the bladder contains H_2S. Many hypotheses have been advanced, with more or less success, to account for this condition, such as absorption from the neighboring intestine, etc.

In a case of cystitis, characterized by the freshly voided urine containing great quantities of H_2S, ROSENHEIM (*Fortschritte d. Med.*, vol. v. p. 345) was able to isolate from the urine a bacillus which appears to have the property of causing the evolution of this gas. It also has feeble powers of decomposing urea into ammonium carbonate. The author omits to state whether catheters had been used in the case, but it is to be presumed that they had been and that they were the means of introducing the bacillus.

In this connection it may be of interest to note that RATTONE and VALENTA (*Archivio per le scienze mediche*, vol. x., p. 311) have discovered a micrococcus which causes hippuric acid to be changed into benzoic acid and glycocoll. This accounts for the spontaneous disappearance of the hippuric acid from urine exposed to the air.

SURGERY.

IN EUROPE.

UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,
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RECENT SURGICAL LITERATURE.

The following volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* have appeared since the last issue of this journal. The volume "Phan" to "Phos" contains a very useful and careful article on the "Pharynx," by

MM. Arnogan and Moure. The pathology of the pharynx is very fully dealt with. M. Mathieu contributes the monograph on "Phymosis" and "Paraphymosis." The work is exceptionally verbose, and occupies no less than seventy-two closely printed pages. The value of the article is seriously damaged by its diffuseness.

The article on "Phlebitis" is disappointing and not up to date. It ignores the important contributions of recent German writers to our knowledge of this affection.

In the volume "Thro" to "Traf" the principal surgical papers are the following: "Thymus," a very valuable paper. "Thyroid:" The Anatomy and Physiology of the Gland, by Drs. Herrmann and Tourneaux; and the diseases of the same, by Broca. The latter monograph is singularly complete and well up to date. "Tibia:" An account of the anatomy of the bone, and of the fractures incident to it, by M. Heydenreich. "Torticollis," by M. Guyon. "Trachea and Tracheitis," by M. Chermont.

The volume "Epid" to "Erec" contains a very excellent monograph on "Epistaxis," by MM. Torgue and Boinet.

In the volume "Ute" to "Val" the papers on the "Uterus" are completed, and an excellent account of the "Anatomy, Physiology, and Pathology of the Vagina" is furnished by M. Petit.

The volume "Hæma to Hemor" contains a very useful treatise on "Hæmatocele," by M. Paul Reclus; a feeble monograph on "Hæmaturia," by Dr. Bourel-Ronciere; and the commencement of an elaborate paper on "Hemorrhage."

Internal Derangements of the Knee-joint. By Dr. Scott Lang (Edinburgh, 1887). This little monograph represents the author's graduation thesis. It deals solely with luxations and subluxations of the semilunar cartilages of the knee-joint. The luxation of either cartilage may be complete or incomplete. In no case would it appear that both cartilages may be displaced at one time. The incomplete displacements are the more usual, the complete being rare. The internal cartilage is much more frequently displaced than the external. The author enters at length into the anatomy and causation of the lesion, and this portion of the monograph is very valuable. He shows that luxation of the internal cartilage occurs when the leg is rotated outward, while luxation of the outer cartilage follows an inward rotation of the limb. In the matter of treatment the author has nothing new to propose.

Leitfaden zur antiseptischen Wundbehandlung, by Prof. Nussbaum (Stuttgart, 1887). This guide to the antiseptic treatment of wounds has now reached the fifth edition, and when compared with the first issue it is practically a new work. It forms a treatise upon the circumstances of wound healing that has no rival. It is singularly complete. The subjects of infection of wounds, of fat embolism, of the accidents and morbid states of wounds, are all dealt with at considerable length, and in an admirable manner. Under the heading of antiseptic materials used in the treatment of wounds no less than eighty different substances are described. Not only is every possible form of dressing described, but in special sections the best mode of treating wounds of individual parts is fully discussed. The author accepts the expression antiseptic treatment in its very widest sense.

Die Verwerthung der Bacteriologie in der klinischen Diagnostik, by DR. GOTT-STEIN (Berlin, 1887). This work considers, as the title explains, the part played by bacteriology in clinical diagnosis. It does not profess to be an original work, but rather a summary and review of our present knowledge of this subject. Such a manual is of great value to the busy physician or surgeon, as it presents a crude and unwieldy mass of material in an assimilable form. The following are the main affections dealt with: typhus, cholera, erysipelas, tuberculosis, leprosy, pneumonia, rhinoscleroma, syphilis, gonorrhœa, suppuration, anthrax, malignant œdema, actinomycosis.

Diagnostik der chirurgischen Krankheiten, by PROF. ALBERT (Vienna, 1887). This is the fourth edition of a well-known work on surgical diagnosis. It has been added to, and brought well up to date. The book forms a most . admirable elementary text-book. It is short and concise. It does not cover the whole field of surgical diagnosis, but deals with the most conspicuous difficulties that come in the way of the learner. The manual would be of greater value if it were better illustrated.

Herniologische Streitfragen, by PROF. W. ROSER (Marburg, 1887). This little work on "Disputed points connected with Hernia," will be read with great interest by surgeons, especially by those who are acquainted with Prof. Roser's masterly contribution to surgery. The points discussed, and the general character of the work, may be illustrated by the following headings: A hernia does not form suddenly. Corpulence as a cause of hernia. Formation of a hernial sac by local stretching of the peritoneum. The constricting cause in strangulation. Venous engorgement and arterial arrest in the strangulated loop. Partial hernia. Pseudo-strangulation. Whence comes the fluid in the hernial sac? Radical operation.

Handbuch der Massage, by DR. HUNERFAUTH (Leipzig, 1887). This very complete and exhaustive treatise upon massage forms an important addition to modern medical literature. The author enters fully into the physiology of the measure, and into the precise details attending its employment. So far as surgery is concerned massage is dealt with in connection with the following affections: Joint affections of all kinds. Fractures, lumbago, muscular rheumatism, hernia, scrofulous gland diseases, varices, flatfoot, hypertrophy of the prostate, and some other diseases. It is to be hoped that an edition of the book will appear in English.

Pratique de la Chirurgie des voies urinaires, by DR. DELEFOSSE (Paris, 1887) This is the second edition of a fairly well-known work upon genito-urinary surgery. The section on the anatomy of the parts is good, although the author, like most French surgeons, ascribes wonderful properties to "Wilson's muscle." The chapter on catheterism is verbose. The section on the treatment of stricture deals largely with instruments, and gives especial prominence to internal urethrotomy. Little or no mention is made of the work of English surgeons. The work would be quite out of date but for that in an appendix some account is given of litholapaxy, suprapubic lithotomy, and the treatment of vesical tumors.

Ueber maligne Neurome, by DR. KRAUSE, is the last surgical contribution to *Volkmann's Sammlung*. It forms a very complete monograph upon malignant or rapidly growing tumors of nerves, dealing with sarcomatous and myxomatous neuromata. The author gives some illustrative cases and abstracts of a number of recorded examples. He makes a special point of the new formations of nerve fibres that are occasionally found in these growths.

Fragments de chirurgie contemporaines, by DR. BRISAY (Paris, 1887). This book consists of a sketch of what the author saw in the department of surgery during a scientific tour. It concerns itself mainly with operative gynecology. The book is well illustrated, but it is fragmentary, purposeless, and unreliable, and admirably adapted for "private circulation only."

Étude sur les Kystes Hydatiques du Rein, by JULES BŒCKEL (Paris, 1887). This forms a very valuable monograph upon hydatid cysts of the kidney. The author deals with the subject in a very complete manner, discussing the etiology, the clinical aspect, and the surgical treatment of the disease. The work is illustrated by a number of instructive and well-recorded cases. It forms an important addition to the literature of renal surgery.

ABDOMINAL SECTION.

SIR WILLIAM MACCORMAC (*Lancet*, May 7, 1887) in an eminently practical lecture reviews the subject of laparotomy for wound or rupture of the intestines. Only two new cases are recorded, one, a patient under the care of Mr. Croft, in whom laparotomy was performed eighteen hours after a severe crush of the abdomen. A large wound was found in the ileum with a rupture of the mesentery and omentum, septic peritonitis being already present. An artificial anus was made, the peritoneal cavity being thoroughly cleansed. Four weeks later an attempt was made to close the artificial anus, the ends being resected and Lembert's sutures being employed. The patient, who was already much enfeebled, survived the protracted operation only a few hours.

In the second case, one of bullet wound, the abdomen was opened and the intestine found to be perforated, but the wound could not be closed.

M. FENILLON (*Gazette des Hôpitaux*, June, 1887) performed abdominal section in three cases of pelvic abscess in women, "suturing the abscess wall to the edges of the wound," in two with a very good result. In the third case the abscess had already burst, producing acute general peritonitis, to which the patient succumbed.

The subject and statistics of *gastro-enterostomy* are treated with characteristic German verboseness in a long article by DR. ROCKWITZ in the *Deutscher Zeitschrift für Chirurgie* for June 22, 1887, who has collected details of 22 cases, performed either for carcinoma or stricture about the pylorus, and the following is an analysis of the final results. 2 cases appear to have been completely cured (both were performed for simple stricture), 5 others were living at periods of from one to seven months. 4 other cases were claimed as recoveries, but all of these died within a few weeks or months from the operation of recurrence or marasmus. In the remaining 11 (50 per cent.) the operation may be credited with having greatly hastened the patient's death. A certain number of unsuccessful gastro-enterostomies which have

been published in America and England are not included—in fact, could the real truth be known the statistics of this operation would probably be considerably worse than Dr. Rockwitz makes them appear.

Two cases of successful abdominal section for acute intestinal obstruction are reported in the *British Medical Journal* of May 21, 1887. In the first (by Mr. Williamson, of Newcastle) several adhesions and two constricting bands were liberated, in the second (by C. Stonham), recent peritonitis was found, and the obstruction was believed to be due to a volvulus of the small intestine which was untwisted at the time of operation.

The value of Kussmaul's plan of washing out the stomach in cases of operation for strangulated hernia and intestinal obstruction is warmly endorsed by Dr. Rehn (*Centralblatt für Chirurgie*, July 23, 1887), who observed its effects whilst the operation was in progress and the abdominal cavity opened. The two cases (obstruction hernia and obstruction from a diverticulum band), unfortunately, ended fatally, but the relief of distention, both of the stomach and intestine by the washing out, was extremely marked and greatly facilitated the operations.

The Treatment of Intussusception.

Mr. Barker (*Lancet*, May 14, 1887) in a case of intussusception of the rectum, due to adenoid epithelioma of that part of the gut, succeeded in drawing down and excising the whole of the affected area after returning the two layers of intestinal wall together. The patient made a good recovery. Three similar cases had been previously operated on (two by Verneuil, and one by Hulenkampff), only one of them recovering.

A fatal case of abdominal section for intussusception in a child was reported by Mr. Dent in the *Lancet* of May 21, 1887. The bowel was reduced with some difficulty, but peritonitis had set in before the operation. A similar case is recorded by Mr. Knaggs in the *Lancet* of June 4 and 11, 1887, and the risk attending forcible inflation illustrated by the quotation of eight cases in which it led to rupture of the intestine. Mr. Knaggs's paper includes a summary of eight successful abdominal sections for intussusception and twenty-nine unsuccessful ones. Although this list includes several not previously published, it is probably far from complete. The writer strongly endorses Mr. Trever's teaching as to the advisability of early operation if inflation fail to relieve.

Resections and Amputations.

Dumont (*Archiv für klinische Chirurgie*, Bd. xxxiv., Heft 2, p. 318) reports five cases of resection of the ankle-joint (including in one case removal of the astragalus and part of the os calcis) successfully carried out by a single external incision, convex downward. All the patients recovered with useful limbs.

Fractures and Dislocations.

The occurrence of a true intertrochanteric fracture of the femur and the possibility of its exact diagnosis during life was proved by a case under M. Hennequin, recorded in the *Bull. de la Soc. Anat.* for July, 1887. Such

fractures, detaching the head and great trochanter from the rest of the bone, are distinguished from ordinary extracapsular fractures by the non-impaction, and from fracture below the trochanters by noting the exact level of the angle of bone below Poupart's ligament, but it is obvious that the latter is a very difficult point of diagnosis.

CHARCOT'S JOINT DISEASE.

PROF. SONNENBURG introduced a discussion on this subject at the German Congress of 1887 (*Centralblatt für Chirurgie*, No. 25). Whilst various opinions were held as to the pathology of the disease, nothing positive appears to have been added to our knowledge; however, a novel method of treatment was illustrated by specimens from four cases in which the affected joint had been excised. Although the results of the operation seem to have been fairly good, it may be doubted whether (considering the advanced age of the patients) a severe operation like excision is warranted in cases of joint disease from ataxia.

PROF. WESTPHAL (*Ibid.*, May 28, 1887) has traced degeneration of nerves in a case of Charcot's disease into the small branches entering the joints, as well as into the one running with the nutrient artery piercing the tibia. JÜRGENS (*Ibid.*) states that he has found pathological changes (relaxation of ligaments and congestion) in all the large joints from cases of tabes, but that similar changes were also noticed in certain cases of mental disease, chorea, etc.

OPERATIONS ON THE KIDNEYS AND BLADDER.

A. EDEL reports in the *Archiv für klin. Chir.*, Bd. xxxiv. p. 423, a case of nephrectomy for renal suppuration, presenting unusual complications. The patient, a man aged thirty-nine, had for many years suffered from renal colic, and finally presented the symptoms of localized peritonitis on the left side, leading to an abscess in the inguinal region and scrotum. This was drained, but was followed by an abscess in the lung, and the pus became urinous. Nephrectomy, with free drainage, was followed by temporary improvement, but then the case relapsed, and further exploration led to the discovery of a third abscess, under the diaphragm, communicating, like the others, with the suppurating kidney. Ultimately, the cavity granulated up, and the patient recovered.

KOCH, in *Brun's Beiträge zur klin. Chir.*, Bd. ii. Heft 3, records three cases of removal of vesical papilloma, two by the suprapubic incision, one after dilatation of the urethra (in a woman). The latter presented a recurrence at the end of two years; the other two remained well. Koch recommends a perineal cystotomy in cases of doubtful diagnosis, but wisely claims for the suprapubic operation alone the means of effecting a radical removal of the tumor. A good analysis of symptoms and record of previous cases is appended to the paper.

E. DE PAOLI (*Turin Medical Journal*) also reports a successful case of removal of a villous growth from the female bladder by the "high method," after the diagnosis had been completed by dilatation of the urethra.

The question of suprapubic lithotomy in children, was dealt with by F. BERESKIN, of Moscow, at this year's Russian Congress (*Centralblatt für Chir.*, No. 22, 1887). 59 operations resulted in 8 deaths, though only 3 could be

directly assigned to the operation ; of 26 cases in children over five years, only one died (of scarlet fever). According to the Moscow Hospital experience, the mortality of the suprapubic method, in young subjects, was actually less than that attending the lateral operation. In two cases the peritoneum was wounded without bad effect.

Considerable discussion was held at the above Congress on the various operations for stone, but the conclusions arrived at differed but little from those of western authorities, the great advantages of litholapaxy being fully recognized, and suprapubic lithotomy again returning into favor.

M. TERRIER (*Sociétié de Chirurgie Bull.*, April, 1887) advocates transperitoneal nephrectomy, with suture of the wound-edge to the margin of the peritoneal wound, so as to shut off the space left by the removal of the diseased kidney from the general peritoneal cavity. Two cases are recorded (one fatal), the incision being made either in the median line or the linea semilunaris. Lumbar drainage is dispensed with, although it is evident that the assistance of gravity is thus lost.

An unusual complication of suprapubic lithotomy—severe hemorrhage into the bladder some days after the operation—was reported by MR. MORGAN in the *Lancet* of May 7, 1887. The patient, a boy of six years, went on well until the fourth day, when hemorrhage occurred into the bladder and the tissues of the groin. After the clot had been washed away through a catheter he made a good recovery. The vesical wound had been sutured with catgut and · a catheter left in for two days, the latter produced nephritis, and was removed. Mr. Morgan attributed the subsequent hemorrhage to distention of the bladder, owing to nephritis, and hence condemns the retention of the catheter after the operation, at any rate in children.

MR. WHITEHEAD (*Lancet*, June 18, 1887) reserves suprapubic lithotomy for cases unsuitable for either lithotrity or the lateral operation, he reports three cases in adults, one for encysted calculus, a second for a large stone ($7\frac{1}{2}''$ in circumference), the third is a case in which no staff could be introduced. Two ended fatally from pyæmia and pneumonia, the third only recovered after a protracted and dangerous illness. It was found to be extremely difficult to recognize and open the bladder in two of the cases; in fact, in one the opening was deferred for a week. Rectal distention Mr. Whitehead regards as unnecessary and dangerous, it having been followed in the first case by severe hemorrhage and muco-purulent discharge.

It would be difficult to imagine a more unfavorable case for any form of operation than the one reported by MR. HARRISON (*Lancet*, June 18, 1887). The patient, a man aged fifty-six, of very feeble condition, had a long and tight stricture, a false passage, calculi in both bladder and urethra, with incontinence of urine. The stricture was divulsed so that a staff could be passed, on this the floor of the urethra was freely divided, a calculus removed, and then, with the finger as a guide, the prostate was incised along its floor with a curved bistoury. Two calculi were now removed from the bladder, and a drainage tube left in the wound for three days. Apart from the fact that the perineal opening would probably be permanent, the patient made a very good recovery. In advocating for certain cases a median lithotomy, with free division of the prostatic urethra, Mr. Harrison in no way dissuades from the lateral operation, which he has performed over a hundred times. At the same time he

claims for his modification (which was employed by Frère Côme in the last century) that it assimilates the median to the lateral operation in many respects, whilst being free from the risks of hemorrhage, and of bruising the prostatic tissues. Whether any permanent injury to the ejaculatory ducts, etc., is liable to follow, must at present remain an open question; nor is it certain that the operation would be free from the subsequent occurrence of incontinence of urine, which is such a distressing sequence of lateral lithotomy, and one more common than is, perhaps, generally believed.

A fatal case of suprapubic lithotomy in a child was reported by MR. GREENWOOD (*Lancet*, June 11, 1887). The case went on well for nearly three weeks, and then died suddenly, no cause being found at the post-mortem examination. Isolated cases of this operation will be found in the *British Medical Journal* of July 16, 1887 (adult female, good result). The same journal for July 2, 1887 (child aged nine, recovery from operation, but death six months later from broncho-pneumonia); *British Medical Journal* of June 18, 1887 (lad aged nineteen, bladder wound sutured, no urine escaped through it subsequently).

Two further cases of vesical papilloma removed through a suprapubic incision, are reported by SIR HENRY THOMPSON (*British Medical Journal*, June 11, 1887), both with a successful result. In one the diagnosis was effected through the discovery of typical papillomatous fragments in the urine, in the other by a perineal exploratory operation. The writer points out that in cases of non-malignant vesical growth, painless intermittent attacks of hemorrhage are among the earliest symptoms, then frequent micturition comes on, and finally, more or less continuous bleeding. As regards the operation, he is not in favor of suturing the bladder wound, but closes the greater part of the abdominal one, leaving a tube in the lower part for two or three days.

MR. EDMUND OWEN (*Lancet*, June 25, 1887) reports a successful case of abdominal nephrectomy for cystic disease of the kidney, no drainage tube being used.

MR. IMLACH (*Brit. Med. Journal*, July 2, 1887) performed abdominal section for what was suspected to be an ovarian tumor; it proved to be a case of hydatid cyst of the left kidney. After removal of the daughter-cysts the main one was sutured to the edges of the abdominal wall and free drainage provided for. The patient made a good recovery.

MR. R. J. GODLEE reported to the Clinical Society (*Brit. Med. Journal*, May 21, 1887) a case of nephrectomy in a child after rupture of an ureter and subsequent formation of a cyst containing urine. The case did well but for the fact that a sinus still remained. In another case a large cyst developed in the abdomen of a boy after a severe injury; it was opened in the middle line, the walls sutured to the edges of the abdominal wound, a good recovery ensuing. In a third case a cyst in one lumbar region (also after injury) was tapped through the seventh intercostal space. The fluid in both these cases contained urea, in one to a large amount, but it was pointed out in the subsequent discussion that this fact did not suffice to assign the cysts to a renal origin.

TUMORS.

The idea that the infective properties of new growths might be due to microörganisms has naturally, of late, attracted some pathologists, but the

series of experiments by Messrs. SHATTOCK and BALLANCE (*Path. Society,* May 17, 1887) give no support to this view. Using various nutrient materials, pieces of sarcoma, epithelioma, etc., were "cultivated," but the results were entirely negative. It was incidentally confirmed by the investigators that the normal tissues of the viscera are wholly free from microörganisms, so long as care is taken, in experimenting, to exclude accidental contamination.

Three elaborate papers on tumors are to be found in the *Deutsche Zeitschrift für Chirurgie,* Band 25, Heft 4 and 5. The first, by DR. FISCHER, records a case of primary melanosis of the penis, and goes fully into the literature of the subject. The second, on the prognosis, etc., of scirrhus of the breast, by DR. HILDEBRAND, is a valuable contribution to the statistics of the operation of excision. The third, by DR. WASSERMANN, treats of the various sarcomata, or "connective-tissue growths" met with about the head, being founded on a large number of cases observed at the Heidelberg clinic. In the *Archiv für klinische Chirurgie,* Band 35, Heft 2, is another careful compilation of cases of melanotic sarcomata occurring in various parts of the body. Although hardly of a nature to allow of abstracting, these monographs can be warmly recommended to those interested in the subject of malignant growths.

OPERATIONS ON THE GALL-BLADDER, ETC.

MR. PAGE (*Lancet,* June 25, 1885) performed cholecystotomy in a case of distended gall-bladder; a calculus was removed from the cystic duct with lithotomy forceps, as well as two smaller ones. The walls of the cyst were stitched to the wound-edges and a drainage tube inserted, the wound entirely closing in five weeks.

DUPUYTREN'S CONTRACTION.

PROF. KOCHER makes an interesting contribution to the study of this disease in the *Centralblatt für Chirurgie* for June 25 and July 2, 1887. Four cases treated by simple incision of the affected part of the palmar fascia, after fully cupping it by Esmarch's bloodless method, are given in detail. The results were very satisfactory, and tended to disprove the view held by some that the skin is concerned in the production of the deformity. Primary union of the wound followed in three of the four cases, no drainage being provided for. A detailed examination of the incised pieces of aponeurosis showed that there was a cellular thickening in the vessel-walls, together with multiplication of the connective-tissue cells—in short, that the process was one of a diffuse chronic inflammatory nature. Whether there was any cell-exudation or not was considered doubtful. The family tendency toward Dupuytren's contraction was well illustrated by one case, the patient's brother, father, and one uncle having all been affected in the same manner.

DISEASES OF THE JAWS.

In a series of lectures published in detail with illustrations in the *British Medical Journal* for June and July, 1887, MR. CHRISTOPHER HEATH deals with a subject of which he has long made a special study. The various tumors affecting the maxillæ and the deformities of the mouth are fully de-

scribed, and the operations for their relief illustrated by a number of cases. To those interested in the subject, Mr. Heath's lectures will be found to contain much valuable material.

Mercurial Injections in Syphilis.

M. Martineau's communication on this subject deserves attention owing to his very large experience, for he has since 1881 treated no less than six thousand patients by this method—*i. e.*, the injection of a peptonate of mercury into the back. Each patient on an average received thirty injections, and subsequently underwent a short course of mercury taken by the mouth. According to the author, the injection plan is by far the most rapid in its results, and is practically free from any risk of causing stomatitis, etc.

" Hammer-toe."

A discussion on the curious deformity of the first interphalangeal joint known as " hammer-toe " took place at the Clinical Society (see *British Med. Journal*, June 4, 1887). Mr. Anderson showed a case in which he had incised the head of the proximal bone with good result. The tendency of the deformity to occur in families was emphasized, and its pathology ascribed to contraction of the plantar fibres of the lateral ligaments and of the glenoid plates. In a debate on the same subject at the Société de Chirurgie (*Bulletin*, April, 1887) MM. Terrier, Verneuil, and Lannelongue advocated incision of the affected joint in preference to amputation. There is no doubt, whatever view be held as to the pathology, that tenotomy of the flexor tendon is quite useless.

Several writers (Messrs. Howard, Marsh, Lucy) have lately called attention in the *British Med. Journal* for May, to a chronic form of arthritis affecting the great toe-joint (metatarso-phalangeal), and occurring almost exclusively in young men. It produces considerable pain and rigidity in the joint, and tends to gradual recovery with some stiffening. Whilst nothing very new was brought out in the discussion as to the pathology or treatment, it was shown that many of the cases are coincident with flat-foot, others, perhaps, being due to inherited tendency to joint-disease.

Cleft Palate.

M. Le Bec (*Gaz. des Hôpitaux*, April 26, 1887) in a case of cleft palate with wide aperture performed an operation advised by M. Lannelongue, detaching a flap from the side of the vomer and bringing it down to the palate. The result was not encouraging, owing to the extreme retraction of the flap, and would not appear to be worth imitation.

Long papers on the anatomy of cleft palate have appeared in the recent numbers of the *Bulletin de la Soc. Anatomique*. The author, M. Broca, has examined a large number of specimens with reference to the doubt lately thrown by M. Albrecht on views first suggested by Grœthe. He confirms M. Albrecht's observations that in a considerable proportion the cleft does not pass between the incisors and canine teeth, although in some it does. Further, there are frequently three incisors developed on one or both sides, and the cleft, if present, will probably pass between the two central and the lateral

incisor. M. Broca's work is very detailed, but unfortunately is poorly illustrated.

Another contribution to the subject of "Cleft Palate and Fissures of the Face" is by DR. MORIAN in the *Archiv für klinische Chirurgie*, Band 35, Heft 2. It is, however, of purely pathological interest.

SYNOVIAL CYSTS IN THE NEIGHBORHOOD OF THE KNEE.

A case of multiple cysts on all sides of the knee-joint in a man of fifty-three of rheumatic tendencies, is reported by MR. MAYO ROBSON in the *Lancet* of July 16, 1887. M. POINIER has been investigating the subject and has from a large number of specimens arrived at the conclusion, that in practically every case the cysts owe their origin to distention of diverticula from the joint. Sometimes they become shut off from the articulation, but careful dissection will even then reveal traces of the previous communication. M. Poinier's papers are to be found in the recent numbers of *Bull. de la Soc. Anatomique*. MR. MORRANT BAKER has arrived at much the same conclusions, and both writers attribute to rheumatic arthritis a large share in the production of the diverticula.

SURGICAL DRESSINGS.

VON MOSETIG MOORHOF strongly recommends an occlusive dressing of iodoform gauze and wool in the case of burns and scalds, gutta-percha tissue being applied astride the iodoform dressing. Under favorable circumstances the dressing may be left for a week or more before changing it; whilst in other cases it is best to apply fresh iodoform-vaseline daily. He has not seen any toxic effects—but the possibility of their occurrence should be borne in mind.—*Wiener med. Presse*, 1887, Nos. 2 and 3.

DE RUYTER (German Surgical Congress, 1887), SENGER and others have to a certain extent vindicated the antiseptic properties of iodoform from the recent attacks of Danish investigators (Heyn and Rovsing in the *Fortschritte der Medicin*). Whilst confirming the fact that iodoform has practically no action on germ-life, etc., outside the body, De Ruyter showed that in the presence of ptomaines the drug is decomposed and has a powerful antiseptic effect. PROF. P. BRUNS (*Ibid*) has treated over fifty cases of cold abscess with iodoform injections (ten per cent. of iodoform mixed with equal parts of alcohol and glycerine) and speaks as favorably of the method as does M. Verneuil, of Paris. He claims for the drug a direct effect upon the tubercle-bacilli.

A NEW OPERATING TABLE.

DR. HAGEDORN, of Magdeburg, to whom the profession is already indebted for introducing several improvements in surgical instruments, has lately devised an operating table especially adapted for antiseptic irrigation during the course of the operation. It is figured and described in the *Centralblatt für Chirurgie*, July 9, 1887, and its chief feature is a median gutter or trench, toward which on either side the surface of the table is made to slope. The table is covered with India-rubber, and the fluid running into the trench is

conveyed by a pipe into a vessel placed beneath.   The ease with which the whole can be disinfected is an obvious recommendation.

INJURIES OF NERVES.

MR. A. BOWLBY (*Lancet*, May and June, 1887), in an interesting course of lectures at the Royal College of Surgeons, described the pathology and treatment of injuries to nerves, and the modes of reunion.   They should be consulted as giving a full account of the present state of our knowledge on the subject.   Mr. Bowlby supported the "trophic influence" view, gave examples of rapid restoration of function after primary reunion of nerves (an interesting case of which, reported by M. POLAILLON, was discussed at the Société de Chirurgie on May 25, and June 10, 1887), and went fully into the subject of "supplementary sensation" after division of a nerve due to communication of its branches with those of adjoining nerves.

MYCOSIS FUNGOIDES.

According to some writers on this rare disease some cases are capable of complete absorption or resolution of the new-growth, thus sharply distinguishing the latter from the class of sarcomata.   H. HÖBNER (*Deutsche medicinische Wochenschrift*, 1886, Nos. 39 and 40) describes one case in which the multiple tumors disappeared under arsenical treatment, he also gives another in which the usual fatal result followed from pneumonia and nephritis.   Very careful research for a microörganism in the new-growths or the viscera was attended with only negative results.   According to HOCHSINGER and SCHIFF (*Vierteljahrschrift für Dermat. und Syphilis*, 1886, p. 361), who report a third case, streptococci were found in the vessels, but their significance appear doubtful.

Four stages are described in the course of this peculiar disease: 1, erythematous or eczematous patches on the skin; 2, small lichenoid elevations; 3, large moist tuberous elevations;   and 4, general cachexia.

DISEASES OF THE RECTUM.

The usual treatment of stricture of the rectum by dilatation is, as a rule, so painful and often so unsatisfactory that were electrolysis an efficient substitute it would be gladly welcomed.   The case recorded by MR. WHITEHEAD (*British Medical Journal*, July 2, 1887) is not very encouraging, as after a thorough trial of electrolysis the stricture was found to be as tight as before. It may be mentioned that Mr. Whitehead discredits the theory of the origin of fibrous stricture of the rectum from pelvic cellulitis or injury in childbirth, and believes that it is nearly always due to a venereal cause.

ŒSOPHAGOTOMY.

DR. G. FISCHER records the successful removal of an eyeglass which had become impacted just below the cricoid cartilage, the patient, a young man of sixteen.   The use of forceps was unavailing, so the œsophagus was opened on the left side in the usual manner.   The wound in it was closed with catgut,

an India-rubber tube employed for giving fluid food, and the progress was one of uninterrupted recovery. An analysis of eighty recorded cases (sixty successful) of œsophagotomy for foreign bodies is appended. Another is added by Mr. Bennett May, in the *British Medical Journal* for May 21, 1887, and presents several points of interest. A child, aged four years, had swallowed a half penny which remained impacted just below the top of the sternum for three years, during which time he had become so emaciated from dysphagia as to be unfit for any operation. By means of a catheter, which was introduced past the obstruction with much difficulty, fluid nutriment was conveyed into the stomach, and as soon as his general condition had sufficiently improved œsophagotomy was performed in the usual manner. Considerable force was required to remove the coin, and a rush of air showed that a communication existed with the trachea or a bronchus. Nutrient enemata were tried for four days, but the patient's condition then compelled a resort to feeding by the œsophagus. The regurgitation of fluids through the wound delayed healing, which, however, speedily occurred after an India-rubber tube had been passed through the mouth. With the exception of an attack of intestinal obstruction, due to impacted feces, the subsequent recovery was almost uncomplicated.

HYDATID CYSTS.

A singular complication of an hydatid cyst in the neck occurred in a girl under the care of Dr. Gardner, of Adelaide (*Brit. Med. Journ.*, July 16, 1887). In the belief that the tumor was composed of caseating glands it was cut down upon, and after evacuating the cyst the latter was found to extend downward into the thorax. Severe hemorrhage occurred on two occasions subsequently, proving fatal. The subclavian artery was found to be eroded in its first part, so that the vertebral and inferior thyroid arteries were detached from the main trunk.

Several cases of severe collapse attending the aspiration of hydatid cysts have been lately recorded, one by Dr. Thomas, of Adelaide (*Brit. Med. Journ.*, May 21, 1887). In this case the cyst was large, and was diagnosticated as of splenic origin. Only three ounces were withdrawn, but syncope rapidly came on, and lasted several hours. The patient eventually rallied under the hypodermatic administration of ether. It seems probable that in such cases the absorption of a poison contained in the cyst-fluid accounts for the symptoms, although it is well known that similar phenomena occasionally follow the aspiration of simple pleuritic effusions.

HYDROPHOBIA.

In June, of this year, the report of the English Commission on M. Pasteur's method of inoculation was presented to the House of Commons, and, speaking generally, it may be said to confirm in all important points the claims made by the great French savant. Experiments made on animals by Mr. Victor Horsley showed that M. Pasteur's preventive inoculations provided a complete protection, while careful analysis of the cases treated in Paris, which was made by Professsor Sanderson and Dr. Brunton, pointed strongly to a similar protection being afforded in the human subject. At the same time

the "intensive method" appeared to have, in more than one instance, directly led to a fatal issue, and M. Pasteur has since modified this form of inoculation. On the other hand, Prof. von Fritsch (*Die Behandlung der Wuthkrankheit*, etc., Vienna, 1887) has, after a careful series of experiments in Paris and Vienna, failed to verify M. Pasteur's conclusions in several important respects. Thus, in rabbits and dogs, submitted to subdural infection after undergoing a series of preventive inoculations, a large proportion, if not all, succumbed to rabies. Even the "intensive method" was of no avail in the majority of instances. So that, at present, the statements of Dr. Fritsch and Mr. Horsley are in direct contradiction with each other.

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The following papers are especially worthy of notice amongst those which have been published during the last three months:

Aëro-Urethroscopy, by Dr. G. von Antal (*Centralblatt für Chir.*, May 14, 1887). By means of India-rubber bags connected with the endoscope the urethra is distended with air so as to facilitate the examination of its wall.

Necrosis of the Aural Labyrinth and Paralysis of the Facial Nerve, by F. Bizold (*Zeitschrift für Ohrenheilkunde*, Band xvi.). Details of 41 cases are given, 28 complicated by facial paralysis. The importance of removal of the sequestrum, as soon as practicable, is dwelt upon, and the various symptoms dealt with in detail. Disturbances of equilibrium are rarely observed.

Case of Perforating Ulcer of the Duodenum, by A. Dutil (*Bull. de la Soc. Anat.*, July 1, 1887). This case was interesting surgically, inasmuch as the symptoms closely resembled those of internal strangulation.

Study of the Fractures of the Upper End of the Humerus, by Dr. Hennequin (*Revue de Chirurgie*, June, 1887).

Tertiary Syphilitic Affections of the External Genitals, by Ch. Mauriac (*Annales de dermat. et syph.*, 1887, Nos. 1 and 2). The author gives details of 26 cases, well illustrating the difficulty which frequently attends their diagnosis from primary chancres, etc.

The Treatment of Syphilis by Tannate of Mercury, by C. Schadeck (*St. Petersburger med. Wochenschrift*, 1887, No. 6). The writer does not claim for this drug any great superiority over the other preparations of mercury, but states that, as a rule, it is less liable to produce salivation.

Spina Bifida Occulta, by J. B. Sutton (*Lancet*, July 2, 1887). A short lecture on the curious overgrowth of hair occurring over the site of defective spinal arches. Six examples are referred to, it is interesting that in two there was a "perforating ulcer of the foot," and clubfoot has also been noticed, although there is, in some cases, no sign of the abnormality in later life except hypertrichosis (usually in the lumbo-sacral region).

Case of Cerebral Abscess following Empyema. Unsuccessful Trephining, by Dr. Drummond (*Lancet*, July 2, 1887). In this case the abscess was situated in the upper part of the ascending frontal lobe, the trephine being applied over the lower. The case is well recorded, and merits careful perusal.

Strangulated Hernia complicated by Suppurative Peritonitis. Operation. Recovery. Dr. J. Bramwell (*Brit. Med. Journ.*, July 16, 1887).

Incision of the Larynx. Dr. Gardner, of Adelaide (*Lancet*, May 7, 1887). In this case, one of epithelioma, in a man of sixty years, the operation was recovered from, but the growth returned within four months.

The Radical Cure of Hernia by Injection, by C. B. HUTLEY (*Brit. Med. Journ.,* May 21, 1887). One case of double hernia, operated on by the writer, has proved a perfect success, having stood the test of time; the two reported in detail only showed that, although severe inflammatory reaction might be produced by the injection (decoction of oak-bark, glycerite of tannic acid, etc.), no curative effect was produced on the hernia.

IN AMERICA.

EXCISION OF THE LARYNX AND PHARYNX.

DR. D. HAYES AGNEW reports in *The Medical News* of April 9, 1887, an operation of this kind on a man, fifty-eight years old, for the removal of a sarcomatous growth as it was considered before operation, but which proved to be a tubular epithelioma. Recognized laryngoscopically by Drs. J. Solis Cohen and C. Seiler to extend down to, but not below the vocal cords, excision of the larynx was advised and performed February 2, 1887, at the University Hospital. After the larynx had been removed the pharynx was seen to be so much involved as to demand its extirpation, "saving a very narrow strip of its posterior wall." The secretions of the mouth and fauces threatening infiltration of the mediastinum by working through the loose tracheal fascia, an aseptic sponge plug, frequently changed, was placed in the fauces. The trachea was plugged with a perforated rubber cork, "through which was passed a siphon tube," its outer orifice being kept covered with antiseptic gauze. The operation was antiseptic throughout. Death occurred on the fourth day, but owing to the absence of a post-mortem examination it is doubtful whether this result was due to heart failure, sepsis, or pneumonia. Should he perform a similar operation Dr. Agnew says that he will certainly make a preliminary tracheotomy some time before excising the larynx.

MIDDLE MENINGEAL HEMORRHAGE—TREATMENT BY TREPHINING.

DR. CHARLES A. POWERS, in the *Medical Record* of June 24, 1887, reports the case of a man twenty-eight years of age, who, brought into hospital thirty-six hours previously in a comatose condition, had regained consciousness and apparently normal motility, but presented at the time of operation the following symptoms:

The pulse was 80, respiration 18, temperature 99°; the patient was perfectly rational. There was complete paralysis and anæsthesia of the left upper extremity, also a slight degree of "fluttering" on the left side of the face. The patient said he did not feel a pin-prick as acutely on the left side of the face as he did on the right. The tongue did not deviate; the right pupil was a little larger than the left; both responded to light. There was no aphasia. The scalp in the occipital and the back part of the right parietal region had a rather "pulpy feel." Serous discharge from the right ear continued, having been preceded by a moderate hemorrhage, and there was now an area of ecchymosis over the right mastoid region about the size of a silver quarter.

After locating the fissure of Rolando—by an unnecessarily complex method —a free crucial incision was made over the motor area of the arm through a "markedly congested" scalp. A fissure was found in the parietal bone running antero-posteriorly three inches from the median line of the vertex, from which blood oozed. A three-fourths of an inch trephine crown was applied over the fissure, at a point where a line drawn from the commencement of the fissure of Rolando to the external auditory meatus would intersect the fissure in the skull. Beneath the perforation was found a clot; the opening was enlarged by the rougeur until an elliptical opening three inches long and one and one-half inches wide was made. The clot was now removed by a spoon-handle, the finger, and irrigation, leaving a depression one and three quarters inches at its deepest part, and whose superficial area measured six and one-fourth inches from before backward, and three and one-half inches from above downward. The dura mater was intact, but several oozing points required ligation. The cavity was irrigated by mercuric bichloride 1 to 6000, and to facilitate drainage a counter-opening was made by a trephine-cut at the lowest point of the cavity, viz., "just above the point where the lateral sinus crosses the lambdoid suture." A drainage tube passing through both openings, a moderate packing of the cavity with strips of iodoform gauze to check oozing, drainage secured by placing antiseptic gauze beneath the scalp wounds at all points, and a large dressing of bichloride gauze and borated cotton applied over all, completed the operation. Strict antiseptic precautions were taken.

The following morning, partial return of power and sensation was detectable in the upper extremity and face: the gauze packing was removed, and the dura mater was found "advanced about half way to the inner surface of the skull." The following day the dura was nearly in contact with the skull. Within forty-eight hours the dura mater and skull had reunited (?) except along the drainage track and where the packing was left. Accordingly, the tube was withdrawn, a horse-hair drain substituted, and various symptoms of cerebral irritation of no special moment succeeding one another, but with a temperature never over 101°—and usually much less—on the twenty-ninth day he was walking about the ward; "rational, pulse and temperature normal, ... functions of left arm equal to those of right."

The remainder of the paper deals with the literature of the subject, and the diagnosis and methods of locating extravasations.

TREPHINING IN A CASE ON INTER-MENINGEAL HÆMATOMA WITH HEMIPLEGIA.

DR. S. T. ARMSTRONG, in the *Journal of the American Medical Association* of June 18, 1887, reports a case in which, nearly two months after a blow from the corner of a brick, which produced a lacerated wound half an inch above the external edge of the left eyebrow without fracture of the skull, sudden slight dragging of the right foot was complained of. The next day, while at breakfast, the patient's head suddenly fell forward on the table, and the right arm and leg seemed paralyzed, but five days later, only some dragging of the right foot and occasional loss of control of the right arm and leg existed. A roaring sound in the left ear persisted from the time of injury, and hearing

was deficient on this side. Two days later, the paretic condition of the leg was more marked and that of the arm slight, but constant and undoubted. Morning chilliness was noted from the time of the first hemiplegic seizure.

The diagnosis was made of a cortical lesion affecting the middle frontal convolutions, and extending upward and backward gradually involving the ascending frontal convolution. This lesion was believed to be a septic purulent inflammation. Sixty-four days after the accident, and thirteen from the appearance of cerebral symptoms, double optic neuritis being present, trephining was done over the middle frontal convolution, and the non-pulsatile, dark-colored dura mater was punctured with the needle of a large hypodermatic syringe, upon drawing up the piston of which, the instrument was filled with dark brown blood, a similar fluid flowed from the needle puncture, which was slightly enlarged, giving vent to much more brownish fluid blood. Four strands of aseptic horsehair were passed through the dural opening, and boracic acid applied to the wound with absorbent cotton and a bandage. By the evening of the day of operation control over the right arm and leg had been regained. On the eighth day, he could walk with "undiminished muscular control," and rapidly recovered.

In regard to finding blood instead of pus, this corroborated the dictum of Nancrede (*International Cyclopædia of Surgery*, vol. v. p. 50) : " A differential diagnosis can, under the most favorable circumstances, be only probable and is in most instances impossible." The literature of the subject is thoroughly reviewed.

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LAPAROTOMY FOR PERFORATION OF THE APPENDIX VERMIFORMIS.

DR. R. F. WEIR, in an elaborate paper in the *Medical Record* of June 11, 1887, treats the whole subject exhaustively. Dr. Weir states that death occurs within the first five days in 34 per cent. of adults according to Fitz, and in 70 per cent. of children, while 44 per cent. of these deaths take place within the first three days according to Matherstock.

In consideration of these data, it seems to him justifiable to urge the necessity of opening all inflammatory swellings of the right iliac region as early as possible. If from too great tenderness palpation is interfered with, and exploration with a good-sized aspirator needle carried in several directions into the lumbar region, as well as deep into the iliac fossa reveals no pus, anæsthesia should be induced, and a conjoined abdominal and rectal examination be *gently* made. "If a tumor be made out, in such circumstances, the use of an exploratory incision running as if for ligature of the external iliac artery, or, . . . one starting two inches in front of the longissimus dorsi muscle and running forward just above the iliac crest, can be resorted to until the swelling is reached, when either aspiration can again be used or the tumor can be directly incised." The author's recapitulation is as follows :

1. That the generality of perityphlitic abscesses are due to inflammation or perforation of the appendix vermiformis.

2. That the mortality in such lesions is greatest prior to the third day.

3. That as soon as it can be recognized, pus should be evacuated extraperitoneally, if possible, or by a lateral laparotomy, and the cavity drained.

4. That if aspiration fails to detect pus where a tumor exists, it is wiser to make an early extra-peritoneal exploratory incision.

5. That where general peritonitis is progressing with any history of a right iliac pain, a limited lateral (preferable) or a median laparotomy should be made, to explore the region of the appendix within forty-eight hours from the inception of the disease.

6. That if pus is thus recognized, it should be evacuated and a drainage tube inserted without toilet of the peritoneum.

LAPAROTOMY FOR PERFORATING PISTOL-SHOT WOUND OF THE ABDOMEN.

DR. J. I. SKELLEY, in the *Annals of Surgery* for July, 1887, reports a case in which after section no wound of any viscus was detected, but the ball and blood having been removed, and a bleeding point in the ball-track, from which blood was flowing into the abdomen, having been secured, all pain and shock ceased. The peritoneum, linea alba, and skin were separately sutured with catgut, and iodoform used, perfect union resulting in one week's time. There was no rise of temperature at any time. Under disadvantageous circumstances strict asepsis was secured, and the important surgical fact demonstrated that even without visceral penetration laparotomy is the best treatment for penetrating abdominal ball-wounds.

SPLENECTOMY.

DR. J. W. LEONARD in *The Medical News* of August 13, 1887, reports for the operator, Dr. James McCann, a case of this rare operation upon a female patient, æt. twenty-nine years. The tumor had been noticed for six years, but her health had been good except apparently as a consequence of three miscarriages, until some time in 1882, two months before her last miscarriage, when she had her first attack of hæmatemesis, followed by seven others up to March, 1886, inclusive. These attacks came on with great suddenness, were of most alarming severity, and the only premonitory symptoms were drowsiness and general malaise. These hemorrhages were only arrested by syncope, until the patient, on her admission to the Pittsburg Hospital, on May 6, 1886, presented all the symptoms of most profound anæmia.

Physical exploration of the abdomen revealed the presence of an extremely mobile tumor occupying the left iliac, and extending to the suprapubic region. " Its surface was flat and smooth, contour well defined, of oblong or roundish shape; dimensions four by five inches; consistency more than semi-solid; percussion note dull, and the auscultatory signs were negative."

The tumor rapidly increased in size for a short time after its first appearance, but for a year it had remained stationary, "except just before a hemorrhage, when it would become considerably enlarged," and then would pulsate violently. There was abnormal resonance over the splenic area. After improvement of her general health by tonics, etc., on May 27, 1886, median laparotomy by a five inch incision was done, and the spleen was removed after separating a broad and firmly adherent portion of omentum. During these manipulations the spleen was ruptured, resulting in profuse hemorrhage, which was promptly arrested by the pressure of an assistant's hand. Full Listerian precautions were employed, even to the use of the spray. Although not more than two (?) ounces of blood was lost, the most profound shock ensued, but reaction took place after numerous hypodermatic injections of

ether and whiskey. She was discharged thirty-three days after operation. Menstruation returned, and persisted until she became pregnant, in October or November, 1886.

A table is appended, showing all the complete excisions of the spleen made since 1881, the date of Mr. Collier's paper—seventeen in all, with twelve recoveries. The reporter is sanguine as to the future applicability and success of this operation, "even in cases of hypertrophy complicated by leukæmia."

SUPRAPUBIC CYSTOTOMY.

DR. F. S. DENNIS, in the *Medical News* of May 28, 1887, first proves that the great changes in operative procedure now in vogue, have been brought about by dissections and experimental work on the cadaver. The modern operation only differs from that of the sixteenth century in the perfection and completeness of its details. Stress is laid upon the additional safeguard against urinary infiltration offered by the use of an antiseptic fluid, instead of ordinary water, for distending the bladder. Dr. Dennis contends that the old suprapubic operation was dropped, not on account of its danger, but because of the great *éclat* with which the perineal operations were received. So completely had this operation been disused that up to 1851 only 260 cases could be collected, and between 1851 and 1879, only a few more were reported.

Since 1879, however, it has been rapidly gaining the confidence of the profession, until Dr. Dennis thinks that Dr. Roberts' prophetic words of a few years since, have almost been realized, viz., that within ten years the suprapubic operation will be the operation adopted for all cases of stone that are not treated by Bigelow's operation. Dr. Dennis further remarks that the time is not far distant when there will be but practically two operations for stone in the bladder, the suprapubic lithotomy and litholapaxy. "It is simple in its technique, safe in its execution, radical in its results, free from injury to the reproductive organs, curative in its application, and, finally, brilliant in its statistics."

The only points as to technique we can refer to, are that no perineal drainage is needed; the catheter must not be retained for more than forty-eight hours lest traumatic urethritis result; the bladder wound *in stone cases* should be left open, while in rupture it may, and should be sewn—since here the bladder-walls are healthy. That this advice is good is proved by the fact that re-opening of the wounds occurs in two-thirds of those sutured after *stone operations.*

The special indications for exploration of the bladder by the suprapubic operation are found:

1. In cases of lithotomy for large, hard calculi; also in lithotomy occurring in a patient suffering from paraplegia, a contracted pelvis, perineal tumors, encysted calculi, ankylosis of the hip, hemorrhoids, or great obesity.

2. For the removal of certain foreign bodies as hairpins, bodkins, needles, etc., for the treatment of chronic cystitis, and for the operation for calculi in the female.

3. In lithotomy occurring in a patient with greatly enlarged prostate, or with fibroma of the prostate, or in calculi found in diverticula behind the prostate.

4. For the excision of tumors of the bladder.

5. For rupture of the bladder.

The advantages are stated to be the safe removal of large, hard stones, inoperable by any other method; the absence of risk of perineal hemorrhage, urinary infiltration, perineal fistula, laceration of rectum and neck of bladder, the prevention of traumatic stricture and cystic hemorrhage, and the avoidance of any interference with the genital apparatus.

In young women no risk of vesico-vaginal fistula exists, nor in the old, permanent urinary incontinence. It is the safest operation whatever form of renal disease exists, and the only means of saving life in rupture of the bladder. The chances of recurrence are less than after lithotrity. Suprapubic lithotomy is also free from danger during its performance. Dr. Dennis has collected 124 suprapubic lithotomies performed since 1879, of which number eighteen died. Seven of these deaths we agree with the author should be subtracted, leaving a mortality of only about nine per cent. The causes of death are chiefly secondary—*i. e.*, due to septic infection, not to the operation itself, and this mortality can probably be reduced by "more rigid antisepsis for the bladder." The author also points out that heretofore this operation has been reserved for stones of a large size, and is in consequence performed in patients much run down, so that when resorted to earlier and for smaller stones the mortality will diminish.

Treatment of Anal Fissure and Hemorrhoids by Gradual Dilatation.

Dr. H. O. Walker, in the *New York Medical Journal* of July 30, 1887, reports that he has treated over fifty cases of this nature with unvarying success by either the gradual dilatation by the finger or a bivalve rectal speculum. The first dilatations are slight, but repeated every three days until the instrument can be expanded to its utmost capacity. Topical treatment with tannin and glycerine, or iodoform and balsam of Peru, is mentioned as having been resorted to in some of the cases, but no stress is laid upon it. If the author is correct in his observations, it is strange that identical results have not followed the somewhat similar methods commonly in vogue. We believe the topical treatment deserves vastly more credit than Dr. Walker accords it.

Horny Growth of the Penis.

Dr. J. H. Brinton, in *The Medical News* of August 6, 1887, records the history of a growth of this nature. The horn was one and seven-eighths of an inch long, by one and three-eighths in circumference at its base, and was curved forward, slightly tapering, and sprang from the base of the glans at the coronal border; it was firmly attached both to the glans and to the preputial puce. On the dorsum, half an inch in front of the corona, a plate of horny tissue, varying in width from three-quarters of an inch to an inch, encircled the end of the glans, covering and destroying the frenum and its attachments surrounding the meatus, and narrowing it to a pin's point. Through this narrowed opening, impervious to any instrument, the urine escaped slowly drop by drop. Owing to the extent of disease, and the involvement of the

urethra, the glans was removed just beyond the corona. Microscopically, the growth consisted in all parts of shrivelled, closely packed squamous epithelial cells, "even more tightly united than in the structure of the living nail," except at the more interior portions, and in the lamellar plates covering the glans. Only fourteen similar cases have been put on record, but one or more are vaguely mentioned. Although occasionally coincident with, or followed by an epitheliomatous condition, they have been, in almost all instances, preceded by a wart, as in the present case. Free removal is advocated, the incisions being carried well beyond the diseased borders.

Appended are references to all recorded cases, so that this paper at a glance puts the reader in possession of all the facts with regard to this rare affection.

The Correction of "Pug-nose" by a Simple Operation.

Dr. John O. Roe, in the *Medical Record* of June 4, 1887, contends that this form of nose is a sign of degeneracy; that it is owing to the overgrowth of the soft parts, the result of interference with the return circulation from obstruction of the nasal passages in childhood.

After applying cocaine, the parts are illuminated, the end of the nose is turned upward and backward, the mucous membrane is dissected from those parts to which it is not too adherent, and the superfluous tissue is removed so as to allow the organ to conform to the shape we desire. Neither too much tissue must be removed nor the skin cut through. In some cases no after-treatment is required, but replacement of the dissected-up mucous membrane. In others a saddle-like splint should be moulded to the dorsum of the nose. Where the deformity is due to bulging out of the alæ from malformation of the cartilages, these must be cut through at various points with a tenotome so as to destroy their elasticity, after which a hard rubber or silver tube must be inserted into each nostril, and the "saddle" before mentioned moulded to the outside of the nose. Illustrations of successful cases are given.

Amputation of the Breast under Cocaine Anæsthesia.

Dr. Daniel Lewis, in the *Medical Record* of June 4, 1887, reports a successful operation on a patient aged seventy-eight years. Dr. Corning induced anæsthesia by his method of application of a rubber-coated ovoid iron ring around the gland, and injections into the layers of the skin of a two per cent. solution of cocaine at intervals of about one-half inch, after tracing the line of the proposed incision with iodine. Several larger injections were made beneath the tumor. No pain was felt except that from the first hypodermatic needle puncture, and the passing of the last sutures in a small section of the lower flap. Twenty-five minutes were consumed by the operation and less than three drachms of the solution was used; healing was complete in seven days.

Ligature of the Internal Jugular Vein for a Knife-cut.

Dr. F. Tipton, in the *New York Medical Journal* of July 2, 1887, reports a case in which the patient ran some distance, bleeding profusely; the hemorrhage was temporarily arrested by digital pressure, until a distal ligature was

passed and tied. All bleeding was arrested until, in the effort to avoid syncope, the patient's head was lowered, when fresh hemorrhage took place from the untied proximal portion of the vessel, which had been only cut half way through, not entirely severed. Elevation of the head at once and permanently arrested the recurrent bleeding. Recovery ensued, but the ligature remained attached for several months.

We are surprised that a proximal ligature was not applied as well as the distal, a rule which is almost as imperative for a *large* wounded vein as for a wounded artery.

BASE-BALL PITCHER'S ARM.

DR. A. H. P. LEUF in *The Medical News* of July 16, 1887, considers this subject most exhaustively. Practically any of the muscles of the upper extremity and of the right side of the trunk may be affected, but the trouble usually commences in the brachialis anticus. In its severer forms, muscles, ligaments, cartilages, and even the osseous tissues are, in Dr. Leuf's opinion, involved.

The author's views as to prophylaxis seem sound, but as to treatment amount to little more than regular daily exercise, "to bring to a climax and final completion those congestive and inflammatory processes in the muscles, ligaments, cartilages, and bones that lead to hypertrophy and necessary increase in strength." These are certainly novel pathological views, although the practice may be good. In the more severe forms "mild galvanism," making use of large flat electrodes applied over the most sensitive points in front of and behind the affected joints, is recommended, the latter part of the day being the preferable time.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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ETIOLOGY OF OCULAR PARALYSES.

In the *Recueil d'Ophthalmologie* for March, 1887, PROF. FOURNIER sets out the distinctions between the symptoms of ocular paralyses, caused by ataxia, and those from lesions of the ocular nerves. If symptomatic of tabetic disorders, he finds the following distinctive points:

1. The paralyses are almost always single or in groups, and partial; the pupil is often implicated in a peculiar manner.

2. There is either the Argyll-Robertson pupil or myosis.

3. The paralyses are often of short duration, sometimes for an instant only.

4. They are especially liable to recur, and often cease spontaneously and quickly.

If of the following characters, a lesion of the nervous system is probable:

1. If the paralysis be complete.

2. If persistent.

3. If relieved only by specific treatment, long continued.

Of 62 cases of tabetic paralysis, the author found but a single one with total paralysis of the ocular muscles. Of the 62 cases the pupil was affected in 37, of which 28 had no other muscles implicated. Of the 9 remaining cases out of the 37, in which other muscles were affected, there were 3 cases of paralysis of the levator and of the internal rectus, 2 of the levator, 2 of the internal rectus, 1 of the inferior rectus, and 1 of the levator and inferior rectus. Of the 62 cases there were 15 myoses, 11 of which were without implication of other muscles. The author emphasizes the existence of a passing strabismus or of temporary diplopia, as thus often indicative of locomotor ataxia.

The Bacillus of Catarrhal Conjunctivitis.

Dr. J. E. Weeks (*Arch. f. Augenheilkunde*, xvii. 3, p. 318) describes a bacillus obtained from an acute case of catarrhal conjunctivitis, that he thinks the source of the infection. Two kinds of bacilli were found in the cultures, but the rod-like variety was proved by cultures to have no pathogenic quality. The one producing the inflammation was shorter than the tubercle bacillus, but of about the same thickness. The period of incubation after inoculation was about forty-eight hours; inoculation always produced the characteristic conjunctival symptoms, and the bacillus in every case, when there was yellowish secretion, was always present.

Tuberculosis of the Conjunctiva.

In *Gräfe's Archiv*, Band xxxii. Abth. iii., Dr. Stölting reports three cases of this serious affection, and bespeaks a more hopeful prognosis than has heretofore been considered possible, and, especially, if the treatment be commenced at an early date. The diagnosis of the disease was rendered certain, in one case by the production of the characteristic bacillus under the microscope, in the second by inoculation and proof of the existence of the bacilli in the animal, and in the third case by both methods. The tuberculous ulcers were situated respectively upon the upper lid, the cheek, and the lower lid. The single and effective therapeutic measure advocated is the complete destruction of the tuberculous centre and deposit by the thermocautery. In some cases this may have to be repeated, or more thoroughly carried out at successful periods, but in each of the three cases cited, complete success was finally attained by this means. The author cautions against unnecessary destruction of healthy adjacent tissue, such as would cause cicatricial contractions, disfigurement, etc.

Injuries of the Eyes by Dynamite.

Professor A. von Hippel (*Gräfe's Archiv*, Band xxxii. Abth. iii.) describes the ocular injuries from explosions of dynamite in twenty cases that have come under his care. The most characteristic changes are in the cornea, and in all instances consist in a great number of grayish-white, punc-

tate opacities, the result of the penetration of particles of sand, stone, etc., into the more superficial or deep corneal strata. The corneal epithelium was in all cases burnt or severely injured. The most serious and frequent complication of the many that may occur is, besides the loss of superficial substance, the perforating wounds of the cornea. The sclerotic was seldom perforated. In only one instance was any considerable fragment of stone, etc., found within the globe. The more severe injuries ended in loss of the eye by panophthalmitis or irido-choroiditis. Of the twenty cases, eight became blind in both eyes, seven in one eye, the vision of the remaining eye being very bad.

Ocular Injury by Lightning.

Dr. M. Knies (*Gräfe's Archiv,* Band xxxii. Abth. iii.) describes a case of this rare occurrence. A ten year old boy was struck with what might be called a spent bolt, while standing by an open window. He at once turned around several times slowly and in a peculiar manner, fell backward to the floor, and was unconscious for two hours. Upon the return of consciousness, both eyes, especially the right, were found much swollen and flowing with tears. The child was weak, dazed, slept a great deal, but had no headache. Four days later the oculist found fresh irregular wounds of the forehead and temple, and these extended down the right sterno-mastoid and the side of the body to the foot. The skin of the forehead was in folds from the constant contraction of the frontalis muscle. The eyebrows and lashes were burned upon both sides, and there was incomplete ptosis with ciliary injection and diffuse corneal opacity. Upon the right side there was a large posterior stellar polar cataract and further lenticular opacity from the equator to the anterior cortex. There was complete amaurosis, but a normal-sized and acting pupil. In the left eye there was beginning cataract and a normal fundus, with vision one-half, not improved by lenses. The ocular motility was not interfered with upon either side. The right cataractous lens was partially removed at a later date, but the patient passed from observation, and the final results are not to be had. Two sets of consequences are, therefore, to be distinguished: First, the direct, consisting in the burning of the lashes, the flesh wounds made by the electric stream, the injuries to the nerves or muscular tissues by the same; second, the indirect, the iritis, the irido-cyclitis, the cataracts, etc.

Relations of Corneal Curvature to Cranial Circumference.

Bourgeois and Tscherning (*Annales d'Oculistique,* xcvi. p. 203), from the measurements of 203 soldiers, found that the radius of corneal curvature varied in proportion to the circumference of the head. Whilst the first rose from 7.78 mm. to 7.92 mm., the cranial measurements were from 54 to 60 cm.

Irido-cyclitis Tuberculosa.

Tuberculosis of the uveal tract is a rare disease occurring not more frequently than once in about 5000 cases of ocular disease. Therefore, the case described in detail by Dr. August Wagenmann (*Gräfe's Archiv,* Band xxxii. Abth. iv.) posesses a peculiar interest. The patient was a man

of forty-four years of age (February 3, 1886), had no tuberculous family history, and syphilis was excluded. The anterior chamber was partially filled with pus, there was prolapse of the upper portion of the iris, the tarsal conjunctivæ were extremely congested. There was no fundus reflex, the ciliary region was very sensitive to pressure, the visual acuity, $\frac{20}{100}$ to $\frac{20}{70}$. The eye was enucleated on February 5, and the suspected tuberculosis was proved by finding the characteristic bacilli, and by the inoculation of animals with the pus. Dr. Wagenmann finds from a review of the literature of the subject, that the disease is usually chronic and monocular, generally limited to the age of childhood, and may be painful or not according to circumstances. Early enucleation is always advisable, since, the diagnosis being certain, there can be no hope of saving the eye, and by this measure as well as by general treatment, a great improvement in health is at once observed.

The Pupillary Immobility of Progressive Paralysis.

Mœlli's study of this subject (*Archiv f. Psych.*, xviii., 1887) is based upon 500 cases. In about half of the cases the light-reflex was destroyed or much below the normal. In only twenty-eight per cent. was there good reaction. Mydriasis is much more infrequent than myosis. There were twenty cases of pupillary immobility in non-paralytic patients. In the majority of these cases syphilis or alcohol was the probable cause. Binocular immobility existed in twelve cases without cerebral or paralytic disease, and in half of these cases syphilis was the undoubted source.

The Relation between Choroidal Crescent and Astigmatism.

Georges Martin (*Annales d'Oculistique*, Mars, Avril, 1887) gives the results of his studies of the relation of the choroidal crescent about the papilla to the axis of astigmatism, and finds in the great majority of cases, perhaps in all, that the crescent is situated at the extremity of a partial contraction of the ciliary muscle, and that this contraction is the cause of its appearance and development. All eyes with a crescent, he finds, are astigmatic, and the direction of the lesion is in a plane parallel to one of the principal meridians, generally, in the one of least refraction. In 358 cases of regular or vertical astigmatism, 336 crescents were external and 22 inferior. In 24 cases of horizontal astigmatism, the crescent was vertical in every case. Of 22 cases of oblique astigmatism, the crescent was vertical 15 times, and 7 times was parallel to the axis of corneal astigmatism. In dynamic or lenticular astigmatism of the 9 cases reported, the crescent and spasmodic astigmatism had the same direction. In 413 cases, therefore, of all kinds examined, the relation was proved to exist in 384 instances, or in about 93 per cent. In 77 cases that are tabulated, 13 were emmetropes, 7 hyperopes, and 55 myopes, 2 cases not being determined.

Cases of Primary Glaucoma in the Young.

Two interesting cases of glaucoma in young people are reported by Dr. O. Lange in *Gräfe's Archiv*, Band xxxiii. Abth. i. The first was in a man of twenty, and had continued with the usual symptoms of clouded vision,

rings about lights, frontal headaches, etc., for over a year, with many sub-acute attacks. Latterly the abnormal increase of intraocular pressure had the peculiarity of an exact rhythmical occurrence. In the morning the pressure was high, decreasing toward noon, and disappearing entirely during the latter part of the day. At first, eserine controlled the glaucomatous symptoms, but it finally became powerless to affect the periodical rise and fall of the pressure. A sclerotomy, according to de Wecker's method, gave permanent relief for several years, when the attacks again came on, and, eserine once more proving of no avail, an iridectomy was made with the desired result of relief up to date. In the second case, a girl of twenty-two, the primary attack was connected with an amenorrhœa of seven months' standing. A de Wecker sclerotomy gave complete relief from what had been severe and frequent attacks of the usual glaucomatous symptoms. The author also adduces an instructive case of recurring glaucoma in a clarionet player, who was always seized with an attack after playing upon his instrument. Eserine, previous to an evening's engagement, always aborted the attacks. From these instances Lange argues that the glacomatous tension may be superinduced by circulatory disturbances, though he is so far from exclusively accepting this, or any other theory, that he sharply, and with much effectiveness, criticises those who thus accept any exclusive dogma of the etiology of the affection. Eserine, which enlarges the vessels, is, for this reason, deemed to have its good influence in reducing the tension, but the author seems to forget that amyl nitrite has no such effect upon the intraocular tension. Mauthner's astounding theory that the increased tension does not necessarily belong to the glaucomatous symptoms, is as sharply criticised as the reverence due to great names will allow. As to the relative frequency of glaucoma in hyperopia and myopia, the author would modify the common belief that it is indiscriminately and excessively higher in hyperopia. Of his 163 cases of primary glaucoma, he finds that of 69 cases of glaucoma simplex, 30 were in myopic eyes, and 38 in hyperopic. In *glaucoma cum injectione,* the proportions were about as commonly given : 10 in myopes and 81 in hyperopes. In the *Archives of Ophthalmology* for June, Dr. R. L. Randolph reports a case of glaucoma in both eyes in a child of eleven years that had existed for over a year. No clew was obtained as to a family history. Vision was $\frac{6}{36}$ in the right eye, $\frac{6}{60}$ in the left, both eyes were under abnormal intraocular pressure, the left being of a stony hardness to the touch. The papillæ were cupped, and there was venous pulsation. The disease was not complicated with any other that could be learned. Operation was declined.

THE PATHOLOGICAL ANATOMY OF GLAUCOMA.

BIRNBACHER and CZERMAK (*Gräfe's Archiv,* xxxii. 2 and 4) present an excellent account of the minute anatomy of seven glaucomatous eyes. The general results are in harmony with Schulten's experiments, viz., that any causes that increase the difficulty of the venous outflow, or that increase the arterial supply, tend to raise the intraocular tension. It is shown that the eyes under study give evidence of circumstances operating toward increased

pressure, in that there is lessened lumen of the veins, caused by inflammatory changes and thickening of their walls, which changes also had the effect of cutting off the ready escape of lymph and other fluids. The primary source of the mischief is thought to consist in injuries of the uveal tract consequent upon inflammation, which prevent the escape of lymph and venous blood.

THE INFLUENCE OF MYDRIATICS AND MYOTICS UPON INTRAOCULAR PRESSURE.

In *Gräfe's Archiv*, Band xxxiii. Abth. i., DR. FRIEDERICH STOCKER publishes the results of his numerous experiments with the principal mydriatics and myotics upon the intraocular pressure of cats, under normal or physiological conditions. Morphine and chloroform were found ill-adapted as narcotics, and curare alone was resorted to. The tension was measured with a manometer, especially constructed for the purpose. The reader may be astonished to learn that the invariable result of the extended experiments was, that, under the influence of atropine, there was a slow diminution of the intraocular pressure. With cocaine there was also a lessening of the tension in every instance,[1] preceded, however, in the majority of cases, by a slight temporary increase of the tension. With eserine there resulted an increase of tension without any stage of diminished tension, but the *final* effect of eserine was to reduce the pressure to a greater degree than it had been raised. Pilocarpine slowly reduced the tension after a preliminary stage of strongly varying pressure, during which there was an average elevation of pressure in both eyes. In all the experiments it was proved that the pupillary play stands in no necessary and essential relation either to the increase or decrease of tension. This result is in direct contradiction to the conclusions of Hölztke and Gräser, who found (No. 13, *Verhandl. d. physiol. Gesellsch, zu Berlin*) that the pressure was raised with the widening, and fell with the narrowing, of the pupil. Regarding the radius of the corneal curve, the experiments show that the mydriatics atropine and cocaine have no influence upon it, in so far as may be learned by the ophthalmometer. The myotics eserine, and pilocarpine have the effect of shortening the radius during the myosis by one-tenth to two-tenths of a millimetre.

SUBCONJUNCTIVAL SCLERAL FISTULA IN GLAUCOMA.

M. MOTAIS communicated to the French Ophthalmological Society (Seance of May 4—v. *Recuil d'ophth.*, June, 1887) his method of operation in cases of hopeless glaucoma. When iridectomies are impossible, or have been proved of no avail to lessen the abnormal tension, and when other devices have failed, and an enucleation seems inevitable, M. Motais recommends the establishing of a fistula. He rotates the globe downward and inward, and plunges a knife into the vitreous at a point between the tendons of the superior and external rectus. The pressure of the eye prevents the healing of the sclerotic wound, but the conjunctiva soon heals, and a subconjunctival fistula is formed, so

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[1] Elizabeth Sargent, M.D., in Archives of Ophthalmology for June, reports a case of diminution of intraocular pressure in a woman, and relief from pain and other glaucomatous symptoms for six or seven months, by the instillation of cocaine.

that the intraocular fluids are in communication with the subconjunctival pocket. In the fifteen cases so treated in the past three years, there was a temporary relief in but two, owing to the failure of the fistula to become permanently established. In the thirteen successful cases the tension has remained normal, and the pain and other glaucomatous symptoms have not returned.

The Spontaneous Absorption of Senile Cataract.

Dr. Paul Meyer, in *Gräfe's Archiv*, Band xxxiii. Abth. i., reviews the literature of the reported cases of spontaneous absorption of senile cataract. He finds that many are open to doubt and discussion, but that others, and especially the more recent cases, are so carefully observed, and with such intelligence, that denial of the fact is no longer possible. There is, of course, no question that juvenile cataract is frequently so absorbed, but as to senile absorption, conservative thought has heretofore been inclined to doubt either the accuracy of the previous diagnosis, or the trustworthiness of the report of reinstated vision. In the June number of the *American Journal of Ophthalmology*, Dr. Charles J. Kipp supplements the meagre literature with another case of spontaneous absorption of senile cataract without injury to the capsule of the lens, and with a restoration of excellent vision. The case is well reported, and there seems to be no doubt of the accuracy of the statement.

The Relation of Accommodation-strain to Glaucoma and Cataract.

To the ophthalmic surgeon the three ocular affections of exceptional importance are certainly those mentioned in the above title, and in uniting the three in a nexus of cause and effect Dr. W. Schoen (*Gräfe's Archiv*, Band xxxiii. Abth. i.) decidedly justifies his happy motto: *simplex sigillum veri*. There can be little doubt that we are only beginning to realize the widespread and variously injurious effects of eye-strain upon the organism generally, and upon the eye in particular. That the accommodation-strain of ametropic eyes may produce glaucoma and cataract is the thesis that Dr. Schoen renders far more than plausible. In hyperopic, astigmatic, and presbyopic eyes (the ones peculiarly strained) the persistent and irritating strain of the ciliary muscle upon its two attachments leads to the accommodative excavation on the one side, and to folding of the lens capsule with radial opacity on the other. Eighty per cent. of the patients subjected to accommodation-strain showed the expected accommodative-excavation. Of 95 cases of equatorial cataract, 92 showed the excavation, and there were in these 95 cases, 39 astigmatics, 39 hyperopes, 11 presbyopes, and 4 whose refraction could not be determined—nearly or quite 100 per cent. showing uncorrected refractive error. There was no case of nuclear opacity without equatorial cataract, and 90 cases of the latter without the nuclear sclerosis, showing that the equator is the starting point of the opacity. Besides refractive errors, leucoma of the cornea, extremely fine work, wearing too strong convex glasses, etc., may produce the strain. The consequences are, accommodative excavation, capsular folds, and hypertrophy of capsular epithelial structure, with other subsidiary injuries, such as overcorrected astigmatism (by the lens), halo, venous

pulsation, blepharospasm, inflammation, etc. The final results are glaucoma simplex, cataract, glaucoma acutum.

VISUAL DISTURBANCES RESULTING FROM CAUTERIZATION OF THE NASAL PASSAGES.

In the *Archiv für Augenheilkunde*, xvii–iii., E. BERGER describes a case believed by him to be unique, where the application of the galvano-cautery to the nasal passages produced a decided amblyopia ("everything as if through a thick fog"). The subsequent spontaneous recovery was gradual. In the *Centralblatt für praktische Augenheilkunde* for May, 1887, DR. ZIEN presents three similar cases of ocular troubles. In the first case cauterization of the hypertrophied mucous membrane of the middle turbinated bone of the right side was followed by indistinctness of sight of the right eye. Sph. $+$ 4.5 gave V. $\frac{20}{40}$ with the right eye; sph. $+$ 4.00, V. $\frac{20}{20}$ of the left. There was pulsation of the veins of the right papilla; none in the left. There was also slight limitation of the right visual field as compared with that of the left. In the second case, cauterization of a small tumor in the inner canthus of the left eye was followed by impaired vision and decided hyperæmia of the papilla of the left eye. In the third case cauterization of the nasal passage, followed by some hemorrhage, seemed to reduce the intraocular tension, and to produce pronounced venous pulsation and papillary hyperæmia.

EPIDEMIC HEMERALOPIA.

In the *Archiv für Augenheilkunde* of June, 1887, DR. THEODORE KUBLI recounts a curious phenomenon occurring in Russia in connection with the church fasts before Easter. Meats and even eggs are forbidden, and, as the period of fasting lasts for seven weeks, there is a great deal of resultant ill nutrition of the body. With other organs, the eye feels the effects of this regimen. Out of 19,588 cases of ocular affections in one hospital in St. Petersburg, from 1882 to 1887, there were 320 cases of hemeralopia, nearly every patient being of the orthodox faith, and the hemeralopia appearing during the fasting season. During the other fasts, extending over much shorter periods of time, there were but few cases presented. As concerns the ages, the older the person the greater the immunity. Of 200 cases of men there were 61 cases, each, from 10 to 20 and from 20 to 30 years of age; 43 from 30 to 40; 18 from 40 to 50; 12 from 50 to 60; 5 from 60 to 70. Among the number many had had the hemeralopia every year from youth. Pregnancy predisposes, but it is noteworthy that of the 320 cases 241 were men. Other ocular symptoms than the hemeralopia were, of course, frequently present, as epiphora, blepharitis, conjunctivitis, xerosis, keratitis, etc., but there were no considerable ophthalmoscopic changes, and the range of accommodation was not affected. The field [?] and the color sense were also normal. Diminished reaction to light was the distinguishing symptom. With Förster's photometer 15 cases had less than one-half the normal sensitiveness, 9 cases less than one-tenth, 11 less than one-twentieth, 8 less than one-fiftieth, and seven less than one-

hundredth. The hemeralopia at once disappears with the resumption of a better diet. Other therapeutic measures were ineffectual. The popular remedy is therefore the best, and this is cooked liver, an article of food not held to be meat by the rigorous devotees!

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MINERS' NYSTAGMUS.

In his interesting lecture on this affection (*Brit. Med. Journ.*, July 16, 1887) C. S. JEAFFRESON brings both clinical facts and general logic to show that the theory of the local character of the disease advocated by Mr. Simon Snell and others is no longer tenable. Many facts go to show that the disease is of central origin, and that the general system may largely share in the morbid process. Choreic movements of the face and extremities, frontal headache, epigastric fluttering, spinal pain, general distress, and even a kind of cardiac nystagmus are some of the symptoms noted, and also go far to disprove the theory of Dr. Dransart, of Belgium, that the essential feature of the disease is a myopathy of the elevator muscles of the globe. The lecturer's theory is that the miners' position produces an interference of vascular supply of the head generally, but chiefly of the parts supplied by the basilar arteries. Hence the ill-nutrition of the visual centres, and the frequent hemianopsia. There is probably also an injurious pressure of the tentorium cerebelli upon the pons, caused by the miners' position, and the cerebellar function being the coördination of muscular action, it also may be interfered with by the causes mentioned.

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REPORT ON 500 ENUCLEATIONS OF THE EYEBALL.

DR. D'OENCH'S report of 500 enucleations by Dr. Knapp (*Archives of Ophth.*, June, 1887) is remarkable for the quantity of clinical material shown. As regards the causes: 234, or about 45 per cent., were enucleated on account of injury, 48 of which were because of a foreign body in the interior. "In 8 of them an attempt at removal was made." Tumors ranked next to injuries; glioma, 18 cases (11 in males, 6 in females, 1 unknown); sarcoma led to 30 enucleations; carcinoma to 9; enchondroma to 1. A "slow cyclitic process" led to 74 enucleations; phthisical eyeball to 40; painful stump to 8; staphylomas to 41 (16 anterior, 15 total, 10 ciliary); absolute glaucoma to 8; ossification of the choroid to 6, etc. In answer to the question whether it is safe to remove an eye in which panophthalmitis has developed, the statistics given show 20 successful cases out of 21 operated upon. 30 cases of death are reported after enucleation.

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THE INFLUENCE OF CHRONIC ALCOHOLISM UPON THE EYE.

DR. W. UHTHOFF'S noteworthy article upon this subject in *Gräfe's Archiv*, Band xxxii. Abth. iv., gathers to a focus the clinical and anatomical results of the study of 1000 cases of chronic alcoholism. As regards the pathological anatomy, the conclusions are based upon the dissection and microscopical examination of seven cases, and the lesion is found to consist of a retrobulbar optic neuritis with secondary atrophy of the fibres. There is a wedge-shaped massing of the nerve fibres about the macula pointing to the central vessels.

At this point there is an interstitial neuritis and degeneration, which is more severe in the retrobulbar portions of the nerve and extending to the cranial part of the same. There is a pronounced increase of the intraneural connective tissue, though healthy nerve fibres are always found running through this network, and in the majority of cases the greater part of the fibres maintain their functional activity. From this fact is explained the common observation that even with positive ophthamoscopic lesions, vision usually remains normal or but slightly impaired.

The cranial portions of the optic nerve and its branches were not examined, but the degenerative changes became less marked the further they were followed from the eye. They were generally of a crescentic shape in the retrobulbar portions of the nerve. No formation of new vessels was noted. The degenerate fibres were those of the inferior and external quadrant of the papilla, those, therefore, supplying the upper and inner quadrant of the visual field, and were wholly made up of the direct or uncrossed fibres. The macula fibres were, if at all, only slightly implicated. Paleness of the temporal half of the papilla was a constant, and the most pronounced ophthalmoscopic symptom in the cases that were subsequently examined post-mortem. In four out of the seven such cases, there had been little or no previous visual disturbance; in the others vision was more or less below the normal. Simple gray degeneration of the optic nerve was not observed.

Of the total 1000 cases that came under observation, 139 had pronounced temporal paleness of the papilla, and of these, there were 60 instances of visual impairment, either existing at the time or that had been previously noted. Of these 60, five only had had visual trouble for but two months or less, whilst with the rest it had existed from six months to fifteen years. In 26 patients that were certain of a previously existing visual defect, there had taken place a reinstatement of visual acuity so that they could read Sn. 1., though central scotomata for green and red were often found present. Indeed, as is well known, color-sense was much more affected than simple light reaction, green and red sometimes producing no peripheral response. In only 2 cases was the amblyopia excessive, $\frac{6}{200}$ being the measure in 1 case, and in the other an absolute central scotoma with a perimacular zone only slightly sensitive to light. There was no case of absolute blindness. In 8 cases the atrophic portion of the papilla was only one-fourth, or less, of its surface. In every instance (of the 60) the lesions were of both eyes. In the remaining cases, 65 of the 139, there was no complaint of amblyopia. 12 had the whitened papilla in but one eye; in 15 cases it was only slightly pale. In 10 cases it was characteristically and decidedly whitened, without producing any visual disturbance; in 8 cases tests were impossible, owing to the patient's condition, etc. In 4 cases, in addition to the temporal change of color of the papilla, there was also paleness of the inner half, though less in degree, coexisting twice with, twice without, defective vision.

In the 1000 cases there were 9 of amblyopia without any ophthalmoscopic changes of the papilla, and 53 in which there was a general cloudiness of the same. There were 6 cases of hyperæmia of the papilla, 7 of retinal hemorrhage, and 60 of pupillary abnormality. Of the latter there were 25 with decided differences of pupillary diameter, 10 with destroyed reflex to light,

and 25 in which it was very slight. Convergence-reaction was almost always preserved. There were 22 cases of paralysis and anomalies of the ocular muscles, 4 of partial xerosis of the conjunctiva, 29 of congenital anomalies of the eye, 15 cataractous lenses, 27 corneal opacities, etc.

The second and concluding article of Dr. Uhthoff (*Archiv*, Band xxxiii. Abth. i.) treats of the special aspects of alcohol amblyopia, and of its relations with other, and especially with tobacco amblyopias. We at last find something authoritative as regards the much-mooted question of the differential diagnosis between tobacco and alcohol amblyopia, and of the relative injury of the eye by these two agents. But it will be regretted that this definiteness is purely negative. Up to this time there has been discovered no reliable ophthalmoscopic sign or other symptom enabling one to decide in any given case. Neither the living fundus oculi, nor visual tests, nor anatomical dissection of the tissues, give any trustworthy answer. The attempt by Poetschke to show a difference in form of the central scotoma (paracentral in pure tobacco amblyopia, pericentral in the alcohol type) is not found to hold.

The following, then, remains the symptom-complex either of tobacco or alcohol amblyopia, so far as concerns visual disturbances: There is central scotoma for red and green in the great majority of cases, and sometimes, also, a failure in response to the same colors in the periphery. In a minority of cases there is a blue scotoma, but it is less extensive than the red and green one. In a very few cases there is an absolute central scotoma—*i. e.*, no response to either color or light, surrounded, first by a zone of blue blindness, and other more extended zones of red and green blindness. The periphery is always sensitive to white light. Few exceptions were found to these rules. There was complete blindness in no instance, and the greatest amblyopia (highly exceptional) was $\frac{6}{200}$.

Out of 30,000 cases of eye-troubles examined by the author, there were 204 of retrobulbar optic neuritis; of these 204, there were 64 clearly due to excessive use of alcohol, 23 as clearly due to tobacco, and there were 45 that were either due to the combined use of the two, or in which it was impossible to distinguish between the two agents. 3 cases were caused by diabetes, 1 by lead, and 2 by carbon disulphide. Of the remaining cases not specifically traceable to toxic agents, syphilis and heredity are credited with 7 each; multiple sclerosis with 5; menstrual abnormality, 3; pregnancy, 4; loss of blood in abortion, 2; vitium cordis and periostitis, each 1; and for 32 cases no distinct etiology could be found. Our space will not permit consideration of many interesting questions treated, such as the relative frequency of tobacco and alcohol amblyopia in different countries, the differential diagnosis between these and other toxic and systemic forms of amblyopia, etc.

OTOLOGY.

UNDER THE CHARGE OF

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Mastoid Operations.

Dr. Albert H. Buck, of New York, has written the article under this heading, in the *Reference Handbook of the Medical Sciences* (Wm. Wood & Co., N. Y.).

He first considers the so-called Wilde's incision, through the integument of the mastoid, down to the bone, as one form of mastoid operation, and then the perforation of the cortex of the mastoid portion of the temporal bone, as, of course, the more important operation. The views of Schwartze, of Halle, are alluded to, in regard to this operation, and are accepted in the main, by Dr. Buck. Schwartze's rules in regard to the indications for the operation are as follows:

"1. In acute inflammation of the cells, with retention of pus, if œdematous swelling, pain, and fever do not subside after antiphlogosis and free incision. 2. In chronic inflammation of the mastoid process with subacute (periosteal) abscesses, or fistulæ in the mastoid. 3. With a sound cortex of the mastoid, on account of cholesteatomata or purulent retention in the middle ear, which cannot otherwise escape, and with which symptoms arise showing that the life of the patient is in danger; or when a congestive abscess has formed in the upper posterior wall of the meatus. 4. When the mastoid appears healthy and there is no pus in the middle ear, but when the mastoid is the seat of long-continued and unendurable pain which other means fail to relieve.

"The operation is of *doubtful* utility in old, incurable middle ear secretion, when no symptoms of inflammation of the mastoid or of purulent retention in the middle ear exist. It is contraindicated when there are positive symptoms of already existing metastatic pyæmia, or of secondary meningitis, or of cerebral abscess."

This latter rule regarding the "doubtful utility" of the operation in pyæmic cases, is not accepted by Dr. Buck, because he holds that in some instances ' in which the symptoms of meningitis or of pyæmia were fairly well marked," the operation has been successful in every way. This operation is recommended by Dr. Buck in cases where leeching and a Wilde's incision fail to relieve permanently the pain in the mastoid region. Operation as early as the sixth day is recommended in some cases of mastoid disease, though "the question of an operation upon the bone does not usually present itself for serious consideration before, say, the tenth day, at the earliest."

"In all cases of comparatively recent origin we must not forget one well-established fact, namely, that the majority of them will, in one way or another, get well without the aid of perforation of the bone." . . . "As there are no statistics at hand which give the exact proportion of deaths to recoveries

among cases of acute mastoid disease not treated by the operative method, it is not possible to show, by the statistical methods, exactly how urgent is the need for operative interference." If delirium, drowsiness, or limited paralysis develop in a case in which, judging from its history and from the conditions observed in the ear, we have already concluded that perforation of the mastoid process would be a useful procedure, we shall certainly be justified in stating that without the operation the chances of recovery are likely to be small. It is in this latter view that Buck differs from Schwartze, in believing that good may come from opening the mastoid even after cerebral and pyæmic symptoms have set in.

Finally, it is claimed that "the operation should be urged as indispensable to life and health in those cases of chronic discharge from the ear which have been characterized by frequently recurring and severe attacks of pain, on the same side of the head, and in which an examination leads us to believe that ulcerative action, with insufficient outlet for the pus toward the middle ear or the external auditory canal, is going on unchecked."

Since among cases of ear disease, in which the mastoid process is more or less involved, there are such great differences, it is extremely difficult, in Dr. Buck's opinion, "to formulate rules which are likely to be of much use to one who sees mastoid disease rarely." In performing the operation of perforation of the mastoid cortex, and exposing the antrum, an imaginary line should be drawn vertically through the mastoid tip, and another at right angles to it, running through the uppermost boundary of the external auditory meatus, and the perforation made close beneath the latter, "as close to the meatus as the shelving condition of the bone will admit." A drill is preferred to any form of gouge, chisel, or trephine by Dr. Buck. In the after-treatment unobstructed drainage must be maintained. Simple antiseptic dressings, and washings by weak bichloride solutions are recommended. The injections into the wound (antrum), as a rule, may be stopped in a week.

FOREIGN BODIES IN THE EAR.

Usually injections of warm water in the external ear will be sufficient to remove foreign bodies from that cavity. There occur cases in which, however, the surgeon must have recourse to other means. And this has induced DR. CHARLES DELSTANCHE, of Brussels, to publish some cases occurring in his practice, illustrative of removal of foreign substances from the ear by other methods (*Annales des Maladies de l'Oreille*, February, 1887).

The first case is that of a man, thirty-eight years old, who used a feather to mop his ear, and apply to it a remedy for chronic otorrhœa. When he was examined by Delstanche, it was found that a piece of the feather had been forced forward and downward toward the Eustachian tube through a perforation in the drum, and by its presence there had kept up great irritation and inflammation of the ear. The fragment of the feather was removed by means of delicate forceps. The hearing improved at once, but as the man had to travel in his business no report as to the effect on the otorrhœa is given.

A second case was under treatment for a mastoid abscess involving the bone, and accompanied by purulent otorrhœa. The sinus in the mastoid communicated with the drum-cavity. A piece of elastic bougie, 1⅛ inches long,

was used as a drain in this sinus. Permission was given to take the patient, a child thirteen years old, to the country, on condition that the drain was maintained in the mastoid fistula. After an absence of five months the patient was brought back in a worse condition, the directions not having been carried out. The mother stated that in the course of the first month after leaving the doctor, the piece of bougie used in the mastoid fistula became fixed and she could not move it. In a day or two it disappeared from view, and the child's ear had then grown worse, and had run more profusely; a small fistula still existed. Examination and syringing failed to detect the foreign substance in the mastoid cavity, middle ear, or Eustachian tube. In three days after the endeavors to find it, the piece of elastic tube came out at the auditory meatus, in a macerated and decomposed state, after a sojourn of five months in the ear.

In a third case, a piece of carrot was put into the ear, and pushed further in by tentative means of extraction, and this was followed by cerebral symptoms.

A laboring woman, forty-two years old, put into her ear a piece of carrot to cure a toothache according to a popular prescription. The next day, when she was unable to remove this, she sought in her fright a physician, who endeavored by dressing-forceps to remove the foreign substance. His efforts resulted only in profuse hemorrhage and prolonged syncope. Fearing again to expose herself to such treatment she applied poultices to her ear, which soon became the seat of violent inflammation and abundant suppuration. Fifteen days after the event she was seen by our author for the first time. She then complained of violent pains in the ear, accompanied by tinnitus, vertigo, and frequent vomitings, which kept her in bed. The tumefaction of the external ear was so great as to prohibit examination of the auditory canal. At first leeches around the ear, and a solution of lead for dropping into the ear, constituted the treatment, but as this failed to change the local symptoms, and as the vertigo and vomiting continued, together with intense earache, meningeal complications were feared, and it was resolved to endeavor to dilate the auditory canal by means of sponge-tents. After allowing a sponge cylinder to remain a half hour in the swollen canal, the latter was sufficiently dilated to permit a view of the outer end of the piece of carrot. A portion of this was then removed. The next day, a sponge-tent was again allowed to swell in the partially freed canal, and the rest of the carrot was taken out. It was found to be the tip-end of a carrot, about one-third of an inch long and one-sixth of an inch wide, and evidently had rested against the membrana tympani. All the inflammatory symptoms now ceased, and in two days the membrana could be seen and was found to be uninjured, though macerated. The hearing became normal in a short time.

In a fourth case, a young lawyer, who had scratched his ear with a Swedish safety match, had at last perforated the membrana in its antero-superior quadrant, and broken off the inner end of the match, leaving it in the membrane. This was carefully seized by small forceps under proper illumination, and successfully and painlessly removed. It measured one-third of an inch in length and was one-tenth of an inch in diameter.

A fifth case is a curious one of encysted foreign bodies in both lobules of a little girl, twelve years old. The lobules had been pierced at three years of age, and she had worn ordinary ear-rings until in her twelfth year, when she

had inserted by a jeweller a modern form of ornament consisting in a jewel for the outside of the lobule, mounted on a shaft, which, passing through the lobule, is held in position by a small screw-nut on the under surface of the lobe. The shafts were evidently too large for the perforation, and caused inflammation and pain, and, finally, profuse suppuration. The child was forced by her parents to endure the pain and the suppuration, which she did for some weeks. Finally, in two months the discharge ceased and the swelling abated. It was then found that the little nuts on the under surface of the lobule had become invisible. Although there was now no suffering, the parents alarmed at the large size of the lobules, resolved to remove the ornaments which were still *in situ* in the ears. This was easily done by unscrewing the shafts in front. These were removed, but the nuts remained in the lobule. Dr. Delstanche's aid was then sought, because the lobules seemed to be getting larger. He discovered a round, hard tumor, the size of a cherry-stone, in each lobe. On the right side the opening was healed both behind and in front of the encysted body, but on the left side the opening on the front of the lobe persisted. Through this, after some previous stretching, the nut was removed. It consisted of a small disk of gold-plated silver, one-tenth of an inch thick, and one-sixth of an inch in diameter, with a milled edge. The disk encysted in the other lobule was removed through an incision on the back of the lobule.

Boxing the Ears.

Dr. Samuel Sexton, of New York, has written an interesting paper on this subject, giving special attention to its medico-legal aspect (*Med. Record*, June 11, 1887). It is claimed that nearly all blows upon the side of the head may injure the ear, and thus range themselves under this category. The article is based on the notes of fifty-one cases, thirty-one being males and twenty females. Of the men, thirteen were boxed upon the right ear, and thirteen upon the left, and three of them upon both ears, one was kicked by a companion upon the ear while bathing, and in one, the ear was injured by having the head squeezed between the hands of another person.

Of the women, fourteen were struck upon the left ear, and six upon the right. Five of the women were assaulted by their husbands. Of the entire number of cases, eight were boxed in play, four by rigorous pedagogues, two by parental disciplinarians, and one, a fervent lover, was struck on his ear by an indignant sweetheart.

Several cases occurred among pugilists, the left ear being usually struck in cross-counter. Others were due to assaults, brawls, and contests generally. Parents ignorant and cruel enough to box children's ears are not likely to take them when injured to a surgeon; hence the comparatively small number of children brought to the dispensaries with ears avowedly injured by boxing, though a large number of those coming for other affections of the ear could recall having had the organ slapped or pulled previously, and then having had subsequently severe pain, tinnitus, and vertigo.

A not uncommon result of a blow or fall upon the ear is the impaction of a plug of cerumen which gives rise to pain, and if it lie long in contact with the membrana tympani, to inflammation. Rupture of the drum-mem-

brane in such cases is often due to the compression of the air in the auditory canal.

The symptoms after a boxing or blow on the ear, are numbness and autophonia with tinnitus. The patient usually feels stunned, but in the entire fifty-one cases seen by Dr. Sexton, only one actually was felled by the blow, and none were rendered unconscious. The dizziness is usually brief; pain is usually felt immediately, though it may not ensue for some hours as a reactive process or as a result of meddlesome treatment. Deafness may be scarcely perceptible. Autophonia is a very constant symptom. In the fifty-one cases under consideration, seven had no discharge, six had a serous discharge only, and in none of them were there any inflammatory symptoms. In six cases there was decided inflammation of the drum and swelling of the drumhead, but no discharge. In twenty-five cases suppurative inflammation of the drum occurred, with more or less severity. In six cases particulars on this head were not noted.

The drum-membrane is usually congested, chiefly in the membrana flaccida, and on the malleus. Multiple ruptures may be found, though usually they are solitary. Their shape varies. If large, they often heal by forming a manometric cicatrix. The prognosis is usually favorable. The diagnosis is not difficult if the ear is examined early enough, or before inflammation has set in. Ruptures from boxing occur for the most part in the membrana vibrans, while contusions and lacerations from pulling the auricle occur in the membrana flaccida.

"A differential diagnosis becomes more difficult when inflammation of the drum, from causes other than traumatic, exists before the injury, or arises subsequently." The appearance of the drumhead a few days after traumatic rupture may suggest a fracture of the malleus; but as the swelling subsides, it will appear that no fracture has occurred.

Treatment. The safe rule, according to Dr. Sexton, is to abstain from doing anything. We would add, excepting to protect the exposed mucous membrane by placing some cotton in the external auditory meatus. Great injury may ensue upon the instillation of any fluid into the canal after such ruptures of the membrana tympani.

The medico-legal aspect of boxing the ear often becomes an important one. But medical jurists must bear in mind that the extent of aural injury where the patient has been assaulted by a blow upon the side of the head, is not to be measured by the force of contact, but rather by the nature of the blow. Sometimes a very slight force, by compressing the air in the auditory canal, ruptures the drum-membrane. It must also be borne in mind that the treatment of the ear, after the occurrence of the rupture of the membrana, has done more harm than the rupture itself, since, if let alone, the opening in the drum-membrane will soon heal.

It is very wisely remarked by the writer of this paper, that the assailant is not the only person to be held accountable for the results of injudicious treatment or neglect. According to law, if one suffering physical harm from the wrongful act or omission of a defendant in a suit, calls in good faith such medical attendance as it is reasonable to presume would be competent to effect his cure or restoration to health, and the physician or surgeon so-called, by erroneous treatment causes positive harm, the plaintiff shall nevertheless re-

cover in the action for damages. If the physician's malpractice could be established, the plaintiff might find him, if pecuniarily responsible, a more desirable defendant than the original assailant.

It is also important to find out whether there has been deafness, or discharge from the ear, previous to or at the time of the alleged injury, and if so whether any increase of the trouble was caused thereby. This is a point concerning which reliable evidence is in many cases either wanting or difficult to get, since in children both may exist without the parent's knowledge.

"The question of permanent injury from shock is likely to come up in some cases. Every one knows that falls and blows upon the head often give rise to vertiginous phenomena, but serious labyrinthine concussion as a complication of ear-boxing is comparatively rare, since the concussion from blows with the hand or fist is broken by the membrana thus protecting the round window." When trauma has produced purulent inflammation of the ear, vertigo, autophonia, and various forms of tinnitus as well as deafness may remain permanently. It is well to remember that deafness from chronic catarrh of the middle ear is more frequently found in the left ear.

Chronic Purulent Inflammation of the Tympanic Attic.

Dr. H. N. Spencer, of St. Louis (*St. Louis Courier of Medicine*, May, 1887), having had a number of cases affected with the above-named disease, has had an opportunity of further studying this interesting and usually intractable disease. The reason this disease does not readily yield to treatment is because it is inaccessible to the ordinary means of cleansing and medication employed for cleansing the lower part of the tympanic cavity or atrium.

Acute inflammations of the attic are characterized by more intense pain than usually accompanies ordinary suppurative disease of the tympanum. They are often confounded with inflammation of the mastoid. Examination of a case of acute inflammation of the membrana flaccida shows it to be characterized by intense redness and tumefaction at the junction of the upper wall of the canal with the membrana flaccida. A free incision with constitutional phlogosis meets the early indication. Judicious local treatment and tonics insure a good result in from one to six weeks.

The chronic cases of purulent inflammation of the attic are not so easily disposed of. This chronic process may be limited to the attic, or it may be associated with purulent disease in the atrium. Dr. Spencer has not observed any marked tendency of this disease to extend to the mastoid cells. He also says, very justly, in our opinion, that "either diseases of the mastoid are of less frequent occurrence in the West than in the East, and less in this country than abroad, or perforation of the mastoid process is often unnecessarily performed; and an overweening desire to add to a number of operations magnifies the subjective and objective indications for surgical interference, and prejudices the otherwise good judgment of the operator. I make this statement with some hesitation, but from a conviction of the truthfulness of it, so far as *my experience* has gone, founded upon upward of twenty-five thousand cases of ear disease seen in private and hospital practice."

There may be said to be two forms of purulent inflammation of the attic, one characterized by swelling and a tendency to poliferation and organization

of tissue, and the other by a thinning of tissue, or tissue-waste. These forms are intensified and rendered more serious by reason of the extended and complicated surface presented by the attic. This space and its contents are, of course, functionally of the greatest importance, as it contains the head of the malleus and the malleo-incudal joint, and the entire body of the incus excepting its long process, which extends downward into the atrium. The opening by which drainage takes place in these cases is in the membrana flaccida (Shrapnell's membrane). In very chronic cases, the membrana vibrans, the portion below the folds of the membrana tympani, will be found to have been destroyed, and of the malleus only a stump will be found.

In all of these conditions of perforation or destruction, when the hyperplastic form of inflammation predominates, the edges of the openings and the surfaces of the cavity, so far as they can be seen, appear red and swollen; not infrequently there will be villous projections, papillary growths, and even large polypi. When the second form, tissue-waste, prevails, the edges of the openings are thin and white, and the tissues beyond are characterized by the same appearance. The discharge is often scanty, and not found until the attic has been explored; it is then apt to be dark brown in color. This second form is the more intractable of the two, and is more likely to result in caries of the bone. The head of the hammer, first, and next in point of frequency, the head of the incus, is liable to become affected by carious action.

Treatment must take into consideration the nature and locality of the lesion. In cases of suppuration of the attic, presenting polypi and polypoid masses, we are advised "to curette the mass or masses as high up as it is possible to do so." An anæsthetic may be employed or not, as seems best. Immediately after the operation, a saturated solution of nitrate of silver is applied, by means of a small cotton tuft fastened to the cotton-holder, well up into the cavity. Dr. Spencer has not found it necessary to neutralize this, but simply dries the parts with absorbent cotton, in order to remove any excess of fluid. Pain, not excessive, may follow this application for two or three hours. Following this procedure, before the slough comes away, instillations of absolute alcohol, or a saturated solution of boric acid in absolute alcohol, are recommended.

In the second class of cases, referred to already, the therapeutical requirements are different, since a plastic process must be controlled. Peroxide of hydrogen may now be employed, and after this application, a five per cent. solution of carbolic acid. Nitrate of silver may also be used in these cases at some part of the treatment, but all stimulation must be of a mild character. In regard to cleansing the ear, Dr. Spencer does not wash out the cavity so often as many do, because he believes that the too frequent use of the bath exercises a prejudicial influence upon any tendency in the tissue toward healthy action." He also believes that while the syringe is indispensable at times, it may also become a means of doing much harm by delaying recovery. "The sooner the syringe is placed in the same category with the paracentesis needle, the sharp curette, and Wolf's spoon, to be employed when a real indication exists, the better for otology and humanity." For these cases a cotton-holder of steel, and unnotched at the end, is recommended. The end sought is great inflexibility, the ordinary cotton-holder being too flexible for the manipulation here set forth.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

PROFESSOR OF DISEASES OF THE THROAT AND CHEST, PHILADELPHIA POLYCLINIC.

Mould-fungi as Causes of Diphtheria.

DR. MICHAEL W. TAYLOR reports cases corroborative of his theory that some common mould-fungi, growing under certain conditions, might originate diphtheria or transmit it. These views are confirmative of views long ago promulgated by Jodin, and to which too little attention has been given by more recent writers on diphtheria.

Unusual Cutaneous Pigmentation in Diphtheria.

WERNER (*Wurtemburg Correspondenzblatt*, No. 7, 1887; *Journal of Laryngology and Rhinology* for May, 1887, p. 169) noted peculiar black spots on the skin of the under lip of a child eight months of age, which appeared twelve to eighteen hours before death, and spread diffusely. They reappeared when brushed away. The mother, after cleansing the child's nose and mouth, saw the same set of black points upon the back of her hands, but could not remove them by brushing. They resisted applications of antiseptic washes. Some weeks later they were scraped away with a knife. They resembled the spots left after a burn with gunpowder. No microscopic investigation was made as to their nature. No other cases were observed.

Atrophic Rhinitis.

DR. DELAVAN, of New York, at the late session of the American Laryngological Association, spoke very encouragingly of treatment by the galvanic current with a force of from four to seven milliampères, the positive electrode to the nape of the neck, and the negative one to the mucous membrane. His only objection was the length of time required in treatment. This is a reintroduction of a treatment of many years ago practised without that insight into the influence of electric currents accumulating with recent experience and study.

Removal of Nasopharyngeal Tumor after Resection of the Superior Maxilla.

DR. NATHAN JACOBSON, of Syracuse, N. Y., reports (Proceedings of the New York State Medical Association, 1886, reprint) an interesting instance of formidable nasopharyngeal myxosarcoma with prolongations into the nasal passages, the antrum, and elsewhere, to remove which he was compelled to resect the upper jaw chiefly after the method of Fergusson. The subsequent

rather perilous progress of this successful case is carefully narrated; some general remarks follow on nasopharyngeal growths and methods of treating them, and the article concludes with a table of twenty-eight similar operations performed in the United States, of which seventeen terminated successfully, the result in two remaining unstated.

OZÆNA.

HABERMANN, of Prague, basing his opinion upon histologic investigation (Zur pathologischen Anatomie der Ozæna simplex seu vera. *Zeitschrift für Heilkunde*, Bd. vii., Prag., 1886; *Semon's Centralblatt*, March, 1887), concludes that ozæna simplex consists in a fatty degeneration of the glandular epithelium, acinous and Bowman's, and apparently of the epithelium of the inflammatorily infiltrated mucous membrane. The transformation of the mucous membrane into a fibrous connective-tissue and its shrivelling, he regards as at first a result of this disease, a result of the reaction of the healthy tissue against the morbid action in the diseased tissue. These changes he has not seen in hypertrophic nasal catarrh or any other nasal disease, and so he regards them as characteristic. He does not attribute their origin, with Krause, to compression of the vessels, but thinks rather that it is due to an agent which gradually works deeper and deeper into the glandular structures, because he finds such glands diseased in their excretory orifices and their superficial acini while the deeper parts remain normal. In the diseased tissues he has never found the microörganisms which he almost always finds in the ozænic secretions. He does not believe that hypertrophic catarrh is a necessary precedent of ozæna simplex, especially as the histologic conditions of the mucous membranes differ in the two affections.

TUBERCULOUS TUMORS OF THE NASAL MUCOUS MEMBRANE.

DR. MAX SCHAEFFER, of Bremen, and DR. DIETRICH NASSE (*Deutschen medicinische Wochenschrift*, 1887, reprint) report eight instances, chiefly in females, observed by Dr. Schaeffer in a total of more than 450 cases of intranasal tumors. The tuberculous nature of the tumors was proven by detection of the bacillus Kochii. All eight originated in the septum narium in its cartilaginous portion and progressed backward. They presented in individual masses, some of them as large as small walnuts, with uneven raspberry-like surfaces. They varied in color from pale to dark red, bled readily to the touch, and were covered with purulent mucus. They felt soft and friable at the surface, and but little harder toward the base. Their removal left a flat ulcer with soft wall-like granular edges and dirty grayish-yellow floor. The underlying cartilage was soft, and showed great tendency to destructive degeneration, which, in three of the cases, terminated in perforation. Posteriorly, there was similar tendency to disintegration of the periosteum; and destruction occurred in one instance. Six of the eight patients had more or less hereditary tendency to tuberculosis. In no instance was there any lupus exteriorly, or any other external evidence of disease except knobby thickening of the anterior part of the nose. There was no evidence of syphilis in any instance. Laryngoscopic inspection and exploration of the chest

revealed only negative conditions. In cases of long standing, the morbid growth had extended further backward, and engaged the mucous membrane of the middle turbinated body, and even the anterior portion of the mucous membrane of the floor of the nose; and in two instances the opposing surface of the lower turbinate was involved, probably by erosive infection. Three cases observed in their commencing stages left no doubt that this form of tumor always originates in the cartilaginous septum.

Nasal Vertigo.

Dr. Joal, of Mont-Doré, has reported to the Société Française de Laryngologie et d'Otologie (*Revue Mens. de Laryngology*, etc., July, 1887) several instances showing that certain vertiginous conditions often attributed to stomachic and other influences are due to temporary or permanent lesions of the nasal passages, curable by treating the nasal lesion. He regards the vertigo as a genuine reflex result of the irritation of the terminal branches of the trifacial nerve distributed upon the mucous membrane of the intranasal structures; a cerebral anæmia being produced by transmission of the irritation through the sphenopalatine ganglion to the vasomotor nerves.

A correspondent, H. D. F., of *The Lancet* (July 2, 1887, p. 83), states that he had been a severe sufferer from hay fever for some forty-five years, climate the most varied, even desert land, making little difference, freedom having been experienced only during long sea voyages around the Cape. At about fifty-six years of age, he suddenly became free, but with absolute loss of the sense of smell, and occasional unearthly objective sensations passing into vertigo and momentary unconsciousness. Though still free from hay fever, he thinks he sneezes more frequently than most people.

The Pathological Nasal Reflex.

At the last annual meeting of the American Laryngological Association Dr. John Noland Mackenzie, of Baltimore, read an entertaining histological study which will agreeably surprise all our readers by its exhaustiveness and its references to show that Plato, Hippocrates, Aristotle, Rhazes, Scribonius, Largus, Galen, and a host of others were aware of the connection between nasal affections and reflex manifestations at a distance. The paper, which should be read at length to be fully appreciated, appears in the *New York Medical Journal* of August 20, 1887.

Relief of Congestive Headaches by Intranasal Scarification.

Dr. Glasgow, of St. Louis, finds (in proceedings of the American Laryngological Association, 1887, *The Medical News* of June 4, 1887) the cavernous bodies full and tense in congestive headaches, the degree of tension corresponding, to some extent, to the degree of headache. For four years he has treated these cases satisfactorily by local abstraction of blood from a simple prick, relief being immediate in many instances.

Empyema of the Antrum.

Dr. B. Fränkel, of Berlin (Ueber das Empyem der Oberkieferhöle, *Berliner klin. Woch.*, 1887, No. 16), after laying stress on the value of rhinoscopy in differentiating from diseases of the antrum certain affections formerly confounded with them, and referring to Ziem's article (*Monatschrift für Ohrenheilkunde, etc.*, 1886, Nos. 2 and 4), expresses his opinion that empyema of the antrum is usually an extension from the dental alveoli, and only exceptionally, and very rarely at that, an extension from diseased nasal mucous membrane. To drain the antrum, Fränkel prefers perforation through the nasal wall to perforation through the alveolus, because the latter method establishes a communication with the mouth, and then the resultant penetration of microörganisms, saliva, remnants of food, and the like, prolongs the after-treatment considerably. He prefers to penetrate the antrum through the lower meatus, after the method described by Mikulicz (*Verhandlung der deutschen Gesellschaft für Chirurgie*, 15 Congress, Berlin, 1886, p. 178), which avoids the objection to the alveolar method, although the drainage is less perfect. The patient is taught to syringe the antrum once or more daily with some antiseptic solution. One case so treated is reported as cured in three weeks, and three similar operations are referred to in an annotation as having proved fully satisfactory.

Death from Œdema of the Larynx shortly after Birth.

H. Vogt, of Bergen (*Norsk Magazin fir Lægevidenskaben*, Sept. 1886, *Annales d. mal. du larynx, etc.*, March, 1887, and Semon's *Centralblatt*, March, 1887), describes an instance in a newborn female, with generalized anasarca and a large and tense abdomen. The child weighed six and a half pounds. It was motionless and unable to respire. The heart-beats were feeble. Death took place three-quarters of an hour after birth. The autopsy disclosed ascites with adhesions between the liver and the diaphragm. The heart, lungs, and kidneys were normal. The larynx was obstructed by an extensive œdematous infiltration of the aryepiglottic folds. The placenta was œdematous. The cause of the dropsy could not be determined.

Sudden Death from Œdema of the Larynx in an Adult.

At a meeting of the Berliner medicinische Gesellschaft, May 11, 1887 (*Deutsche med. Woch.*, May 19, p. 433), Dr. B. Fränkel, of Berlin, presented a specimen from a patient who, when seen by him, had been sick only an hour, and with symptoms of severe dyspnœa. Laryngoscopic inspection revealed serious œdematous tumefaction of the epiglottis and of the aryepiglottic folds. The patient was sent to an adjoining clinic for tracheotomization, but fell dead in the cab on the passage, without any asphyxic paroxysm, and without convulsions. Tracheotomy was performed, and artificial respiration instituted, but without success. Section showed, in addition to the œdema of the larynx, great contraction of the left kidney, the right kidney being enlarged and in a condition of parenchymatous turbidity. Very relaxed heart with slightly thickened left ventricle. The œdema of the larynx seemed to Fränke to have been the first sign of hydremia following contracted kidney.

No anasarca was discovered anywhere. Considerable albumen was found in the urine present in the bladder after death. Virchow raised the question whether the case had not been one of erysipelas, and in the recent session of the Society Fränkel was enabled to answer in the negative, as the result of microscopic investigation for erysipelas cocci. He had found an inflammatory condition which might have accounted for the œdema.

Topical Cures of the Tuberculous Larynx.

At a meeting of the Soc. méd. des hôpitaux of Paris, held May 13, 1887 (*Le Progrès Médical*, Mai 21, 1887, p. 428), Prof. Gougenheim reported twenty-five instances of cure of tuberculosis of larynx, pharynx, etc., by the method of Krause as practised by Hering, namely, energetic friction with strong solutions of lactic acid, in some instances after preliminary scraping or scarification. In thirteen cases of tuberculosis of lungs and larynx a definitive cure was procured in from three to twelve months. In nine others recurrence ensued after cure of the preceding local tuberculosis, and re-cicatrization took place in three of these. There were six instances of cure in cases of ulcerations of the pharynx, the tongue, and the nose.

Swallowing Rendered Easy in Tuberculosis of Larynx.

Under this head (*The Lancet*, July 2, 1887, p. 13) Dr. R. Norris Wolfenden, of London, calls attention to a method of swallowing adopted by one of his patients by which the subjects of laryngeal phthisis can readily drink even large quantities of fluids. The patient placed himself on a couch stomach downward, with the head and arms hanging free over the end, and with the feet higher than the other portions of the body. He then placed a section of rubber tubing six inches in length in a tumbler of water held between both hands, and with the free end of the tube between his lips drained the contents off without stopping, and with the greatest ease and comfort, and without pain or cough. In the ordinary position a teaspoonful of fluid was as much as he could manage to get down, and this only at the cost of much pain and terrible paroxysms of cough.

Lupus of the Larynx.

Dr. Michael Grossmann, of Vienna (Ueber Lupus des Kehlkopfes, des harten und weichen Gaumens und des Pharynx, *Medizinische Jahrbücher der k. k. Gesellschaft der Aerzte* in Wien, 1887, iv. Heft, S. 186, illustrated by chromolithographs) in an interesting summary reports two cases, one of which was reported in 1877 (*Allg. Wien. med. Ztg.*, 1877, No. xx.), and has been under his observation ever since.

I. J. W., a ten year old boy, lived for six years in a musty, damp dwelling, and left it in his seventh year with moderate lymphatic tumefaction in the left submaxillary region. Following suppuration undoubted lupus vulgaris began in the edges of the ulcer, and eventually involved the entire skin of the region. Two months after the earliest appearance of lupus in the skin, the

boy began to be hoarse at night without any special exposure and without any special suffering. On laryngoscopic inspection, movement was found almost unimpaired, and nothing abnormal was noticed except general hyperæmia of the larynx. The child was reëxamined two or three times a week at first, and then nearly every day. Nothing but the hyperæmia was noted for nearly two months, despite daily progressive loss of voice to actual aphonia, and there was no local suffering. In the fifth week severe spasmodic cough set in, especially at night. From that time onward, the laryngoscopic picture changed from day to day. The mucous membrane of both surfaces of the epiglottis, of the arytenoid cartilages, and the interarytenoid fold acquired the appearance of a pronounced trachoma of the conjunctiva. The deeply injected mucous membrane had lost much of its pellucidness, and its surface was closely overlaid with granulations varying in dimensions from smal! poppy to miiletseeds. A few days after this condition had been noted, the same conditions ensued on the soft and hard palate. This condition continued unchanged for from two to three weeks. At about the fourth week the free border of the epiglottis began to get more uneven, thick, and plump, and instead of the original soft granulated surface, a greater confluence of these granulations took place. In this manner strongly prominent and intensely injected nodules were formed. The same thing occurred in the hard and soft palate. In both localities the top of the protruding nodules underwent first an epithelial and then in a few days a deeper loss of substance, establishing ulcers. While spontaneous cicatrization would be going on in these ulcerations, fresh ulcerations would be produced in other places in the same manner. Often two or more contiguous ulcerations would coalesce into a single extensive one. This process of ulceration and cicatrization took place in the different portions of the larynx, hard and soft palate, without producing any impediment in swallowing or any other trouble. At the end of about a year, a swelling began in the anterior portion of the posterior wall of the larynx, which increased from day to day, and within five or six weeks projected into the interior of the larynx as a tumor, and covered two-thirds of the glottis, producing considerable dyspnœa at night, much slighter in the waking condition. After some cauterization with lactic acid under cocainization, to relieve the dyspnœa, the swelling underwent spontaneous diminution for a time. Treatment by lactic acid has been continued with satisfactory results, the morbid processes subsiding much more rapidly than they do spontaneously.

II. This was in a twenty-seven year old female, under Neumann's care, with primary lupus of the left conjunctiva and eyeball, with extension to the wing of the nose and upper lip. In talking to her (1877) Grossman noticed that she was hoarse, and on questioning her found she had always been hoarse. There was a large heart-shaped defect in the central portion of the epiglottis; the vocal and ventricular bands uneven, knobby, and covered moderately with granulations, with a tag of similar tissue beneath the anterior commissure of the vocal bands. No abnormity was seen in the mouth or throat, except a cicatricial distortion of the uvula. During the ensuing ten years the laryngoscopic appearance has hardly changed, but the hard and soft palate, and particularly the pharynx, have become implicated.

CYSTS OF THE LARYNX.

In the *Annales des Maladies de l'Oreille, du Larynx*, June and July, 1887, is published a paper read by DR. J. GAREL, of Lyon, to the Société de Laryngologie, April, 1887. He reports sixteen cases out of a total of sixty laryngeal neoplasms seen by him; a proportion so largely in excess of the usual experience as to suggest the suspicion, were it not for the conclusive character of the reports, that most of them had been examples of masses of pellucid mucus adherent to the vocal bands. Attention may be called in this connection to the circumstance that cysts of the larynx have, as a rule, been found much more frequently on the right side of the body, in contradistinction to the preponderance of other neoplasms on the left side.

LARYNGEAL POLYP REMOVED WITH THE FINGER-NAIL AFTER LARYNGOFISSURE.

DR. FRANZ SCHOPF (Aerz. Bericht d. öff. Bezirker-Krankenhauses in Sechshaus für 1875, Wien, 1886; *Semori's Centrallblatt* for March, 1887, p. 321) reports a polyp, the size of a bean, located below the glottis. Dyspnœa; tracheotomy; laryngoscopy very difficult. Laryngofissure; polyp soft, and removed with the finger-nail. Wound in larynx healed by first intention. Canula removed after a month. Voice better, but still deep-toned. Breathing free. Recovery.

PACHYDERMIA LARYNGIS.

In the *Berliner klinische Wochenschrift* of August 8th is published a lecture by VIRCHOW on pachydermia laryngis. He calls attention to the fact that squamous epithelium covers the mucous membrane located between the arytenoid cartilages and continues uninterruptedly forward upon the vocal bands to their anterior extremities. This portion of mucous membrane, like the squamous covered mucous membrane of the mouth, pharynx, and œsophagus, closely resembles the epidermoidal layers of the skin; that is to say, it possesses a more or less *cutaneous or dermoid* character. The dermoid portions of the larynx are not provided with glands; they have a relatively dry quality; they furnish none of the copious secretion observed in their immediate proximity; in short, they represent a domain of their own. In this region a number of processes are evolved which are not evolved in the same way on those surfaces which are clothed in the usual manner with ciliary epithelium and which possess the character of mucous membrane in its restricted sense.

There are two varieties of changes in chronic inflammatory processes in the larynx which so greatly exceed the ordinary volume of simple chronic catarrh, that they must be separated therefrom. In both varieties a greater quantity of squamous epithelium is formed. In one this is the chief change; not only quantitatively, but because the longer the process continues the more the epithelium acquires an epidermoidal character. In the other the changes occur more in the superficial layers of connective tissue, that is to say, in the mucous membrane proper. The latter produces a more diffuse swelling; the former is circumscribed in individual and usually very small points.

By virtue of the dermoid character of the affected parts Virchow has long been accustomed to group all these processes under the name *pachydermia*. Thus there are two different forms of pachydermia laryngis; one diffuse in which a tumefied condition of mucous membrane prevails, a relatively smooth form; the other limited to small places, more circumscribed and which he calls warty (pachydermia verrucosa).

The term papilloma is a misnomer and is not used by Virchow. He would gladly see it expunged from literature. As the growth is a development and hardening of the epithelium, it should properly be termed epithelioma, a term already misapplied to a certain variety of cancer. Scientifically the term epithelioma should indicate that form of tumor in which epithelium predominates, and epithelioma should be divided into the hyperplastic variety which is formed from like tissue, and the heteroplastic variety which occurs in unlike tissue. According to Virchow's view, warts of the larynx are of epithelial nature. Formerly they were called quite correctly condyloma, but this term is now otherwise interpreted in medicine and cannot, therefore, be intelligently applied. The only name which cannot be misunderstood is hard wart (verucca dura seu cornea).

Curiously enough these warts or papillomas have been scientifically assigned to the fibromas, but this is a great error. The connective tissue forms too little a contingent to justify the name fibroma.

Virchow's distinction between papillary warts and papillary cancer is this: He considers all these as benign, simple, local, and only superficially hyperplastic in which the sharp normal demarcation is found at the base of the epithelial layer. Any trace of epithelium in the connective tissue he regards as suspicious. Neither a flat swelling nor a papillary growth should contain anything below the boundary line which belongs to the domain of epithelial formations; all this must lie outside of and beyond the connective tissue line.

Epithelial formations beneath the boundary line he considers cancerous. It is, therefore, important to examine carefully the base of a morbid growth before it is submitted to section, and even before hardening. Otherwise spaces between the papillæ may be mistaken for alveoli with epithelial contents. If there is nothing foreign at the base of the growth, then, no matter what may be found on the free surface, it is a local formation of benign character from which nothing malignant will be developed later.

The question of recurrence has nothing to do with this examination. That recurrence may take place is fully established. A new formation may take place close to the cicatrix marking the seat of a previous growth, but by repeated removals even the last vestige may be definitively disposed of. That such warts may subside of themselves like warts of the skin has been maintained by many who believe to have seen instances. Warts on the hands have usually only a certain duration. If they remain a long time they usually drop off even when they have not been violently attacked.

ACCIDENTAL INTUBATION OF THE LARYNX IN THE PASSAGE OF THE STOMACH TUBE.

DR. COUSTOUX, of Nantes, reports (*Annales des Maladies de l'Oreille, du Larynx*, etc., July, 1887, p. 320) in detail an instance of this accident from

which he draws the inference that it would be prudent, after passing a stomach tube, to ask the patient some question so that his answer would give phonatory evidence that the tube was not in the larynx, as otherwise injections might be made which would produce suffocation.

INTUBATION OF THE LARYNX.

PROF. CARL STÖRK, of Vienna (*Wiener medicinische Presse*, No. 12, March 20, 1887), speaks very favorably of intubation, and illustrates an improved instrument designed by him for introduction and withdrawal of the tube, which he considers superior to the appliance of O'Dwyer for that purpose. This instrument, an illustration of which can also be seen in the *Journal of Laryngology and Rhinology* for June, appears to be modelled on the trivalve tracheal dilator of Laborde, the middle branch being formed on three links, the terminal one of which is provided with a detachable pear-shaped extremity, and the lateral branches terminating in cup-shaped extremities then enclose it.

Interesting papers on Intubation were read at the recent annual session of the American Laryngological Association by DRS. INGALS, of Chicago, and SAJOUS, of Philadelphia (*New York Medical Journal*, June 11, 1887).

The former, whose personal experience has been extensive, called special attention to feeding patients as little as possible after intubation, and avoiding liquid nourishment as much as possible, to prevent complications from escape of food into the air-passages. This paper constitutes an excellent summary of the entire subject, and is replete with details valuable to all who may have occasion to practise the operation. Dr. Sajous' paper occupies much similar ground; but its essential feature is in the presentation of a peculiarly formed tube constructed to overcome the several difficulties occasioned by the tube of O'Dwyer, and of a special appliance for its readier introduction and removal. The discussion upon these papers cordially endorsed the method as a frequent substitute for tracheotomy.

LARYNGECTOMY.

Three additional laryngectomies by HAHN, of Berlin, for carcinoma are reported by COHN (*Deutschen medicinische Wochenschrift* of June 2, p. 470), two complete and one unilateral. Of Hahn's 9 total extirpations previous to these, 2 are dead from recurrence, 1 a sarcoma, at six and four months after operation. 1, seventy-five years of age, is well seven years after operation: and another, still living, is in a condition of recurrence. Of the entire 10 cases of total extirpation, 4 died within a few weeks, 1 of erysipelas, 1 of mediastinitis, 1 of pleuritis and pulmonary gangrene, and 1 of pneumonia. Of the 4 partial exsections, 2 for carcinoma, none died from the operation. In 1 case recurrence took place within four months, and the extirpation of the larynx had then to be made complete.

A MODIFIED LARYNGECTOMY.

At the recent session of the American Laryngological Association, DR. J. SOLIS COHEN, of Philadelphia, suggested (*New York Medical Journal* of June

18, 1887) that in many instances in which the larynx is removed entire, the same purpose will be equally accomplished, and with far less risk to life, by simply removing with the soft parts so much of the anterior wall of the thyroid cartilages as is necessary to insure the complete removal of the respiratory contingent, leaving the wings of the thyroid cartilages almost intact and with their anatomical connections undisturbed.

ANEURISMAL PRESSURE ON PNEUMOGASTRIC AND RECURRENT LARYNGEAL NERVES.

DR. DAVID NEWMAN, of Glasgow, in a lecture on some points in relation to the Diagnostic Significance and Therapeutic Indications of Laryngeal Symptoms resulting from pressure of aneurisms upon the vagus and recurrent laryngeal nerves (*British Medical Journal* of July 2, 1887, p. 1) describes four cases from the records of which he desired to show : *First*, that aneurism of the aorta and innominate artery may exist and give rise to laryngeal symptoms only ; but in most instances, on critical examination, certain collateral signs may be made out sufficient to warrant one in forming a positive diagnosis, or to give rise to a very strong suspicion of an intrathoracic tumor. *Second*, that in the early stage pressure may cause paroxysms of most urgent dyspnœa, accompanied by laryngeal stridor and paroxysmal cough. *Third*, that at a later stage paralysis occurs usually, but not always, limited to one side, characterized by phonative waste of breath and imperfect cough, but without dyspnœa, except when reflex spasm is indicated on the opposite side, or when pressure-stenosis is caused by the aneurism. *Fourth*, that in certain cases tracheotomy should be performed, not only to prevent impending death from asphyxia, but also as a remedial measure.

The recommendation of tracheotomy as a remedial measure in cases in which the paroxysms of dyspnœa are due to laryngeal obstruction and not to actual pressure on the trachea, is mainly based upon personal experience, clinical and pathological, to the effect that in a large number of cases of aneurism death by hemoptysis is preceded by threatenings of laryngeal suffocation, while the rupture of the sac has in many cases been directly caused by the spasmodic attacks of dyspnœa.

TOPICAL MEDICATION OF THE TRACHEA AND BRONCHI.

DR. MAX SCHAEFFER, of Bremen (*Monatsschrift für Ohrenheilkunde*, etc., No. 4, 1887), has noticed the similarity of asthmatic dyspnœa with that produced by the introduction of medicaments into the trachea. The patients think they do not have enough air in the lungs, and make inspiratory efforts in consequence; and then, when the trachea and bronchi become overfilled, they swallow air into the stomach. The compressed air in the trachea and bronchi excites spasm of the glottis by irritating the inferior surface of the vocal bands. The patient springs up with cold perspiration on his face, and clutches his throat anxiously. Finally the irritation on the vocal bands becomes too great, the bands separate by mechanical pressure, most likely, and the air escapes noisily from trachea and bronchi, and then from œsophagus and stomach. With crackling eructation the patient experiences relief, and

a deep inspiration convinces him that he is not going to choke to death. Schaeffer's success with electrization in asthmatic paroxysms led him to treat spasm of the glottis, from introduction of medicaments, in the same manner. He places the electrodes of a strong current of induction upon both sides of the larynx, and controls the spasm at once. Believing that such spasm is more or less an expiratory dyspnœa, he endeavors to prevent its occurrence by the following method of manipulation : The patient is to take a deep breath while the mirror is being placed in position ; he is made to say *eh* while the insufflator or syringe is being introduced ; and then the medicament is propelled during an inspiratory phase of a quiet respiration. With children, he applies powders through the nose during an inspiration with the mouth closed, and these powders reach at least the upper portion of the trachea.

Carcinoma of the Thyroid Gland, and its Typical Anatomical Course.

An autopsical study of a carcinomatous tumor of the thyroid gland has led Dr. D. Aigre, of Boulogne-sur-Mer (*Revue Mensuelle de laryngologie*, etc., June, 1887, p. 304) to some shrewd clinical and anatomical observations which merit abstract with some detail. The tumor in question involved the left lobe, which passed completely around the pharynx and œsophagus, in front of the prevertebral connective tissue, and rejoined the extremity of the healthy right lobe. Slight involvement of the trachea existed in the form of two small hernia-like polypoid productions at the anterior segment of the third ring. The œsophagus was pushed curvilinearly considerably to the right, its external surface being inseparable from the tumor and involved in its substance, presenting interiorly a limited circle of softened mucous membrane, with slight inequalities and numerous anfractuosities and one partially detached pear-shaped excrescence the bulk of a small nut. The left carotid was slightly displaced, but otherwise normal. The primitive left jugular was distended to the size of a little finger, and filled with readily detachable neoplasmic tissue similar to that of the tumor ; and one of the thyroid veins was similarly enlarged and filled with the same kind of tissue. The right recurrent laryngeal was normal ; the left one could not be traced beyond the inferior limit of the tumor.

In studying the features of this case in connection with six others reported in literature since the publication of Krishaber's monograph in 1882 (*Annales Mal. de l'oreille du larynx, etc.,* Nov. 1882), Dr. Aigre finds some errors and some omissions in the classic descriptions given by general authors. Thus, as to the precocious acute pains irradiating along the neck and upper limb, believed to be sufficiently constant to constitute an important element in differential diagnosis, they were affirmed to be absent in three of the seven alluded to, and not mentioned at all in the accounts of the other four. Instead of death by the cancerous cachexia, as described by general authors, death, in these seven cases, took place three times by dyspnœa, once by dysphagia, once by repeated hemorrhage, and once by intercurrent nephritis. It appears that the thyroid gland shares with its neighboring organ, the larynx, an immunity, as a rule, from carcinomatous generalization.

Though obliteration of the primitive jugular vein is so frequent as to be

almost always cited, there is no record of any phenomena of cerebral stasis due to obstruction to the blood-current; nor is there any mention of abnormal development of the anterior jugular or the vertebral, which act as compensators, without enlargement.

The encircling of the trachea and œsophagus, so frequent in these tumors, and the easy separation of the mass from the other tissues with which it is in immediate relation, struck Dr. Aigre as typical, and led him to make some anatomical investigations which confirmed the special description of the connections of the thyroid gland given by Sappey, but by no other anatomist, and which, in his opinion, accounts for the peculiarities in the course taken by the cancerous thyroid. Aigre's researches on cadavers of different ages, sexes, and plumpness, gave uniform results, as follows: The thyroid gland being exposed enclosed in its capsule, it is found very easy to isolate the vasculonervous mass with which it is in relation by an intermediate layer of connective tissue, and thus to get down to the prevertebral aponeurosis. From this aponeurosis the œsophagothyroidean mass can be readily separated with the handle of the scalpel. This separation being made to a certain extent, the thyroid gland, the trachea, and the œsophagus can be removed *en masse* by means of two transverse sections, one above the hyoid bone, the other at the level of the sternal notch. If this mass be turned over and a vertical incision be made in the middle line of the posterior face of the œsophagus, a thin fibrous membrane may be lifted with the forceps and be detached from the longitudinal musculature of the œsophagus, and then be dissected off on the two sides as far as the posterior border of the lobe of the thyroid. At this point the fibrous layer doubles to envelop the proper tissue of the thyroid gland in continuance with its fibrous capsule. This disposition of the layers of connective tissue controls, according to Aigre, the direction followed by the neoplasm.

DERMATOLOGY.

UNDER THE CHARGE OF

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THE ETIOLOGY OF IMPETIGO, FURUNCLE, AND SYCOSIS.

According to the investigations and interesting experiments of BOCKHART (*Monatshefte für praktische Dermatologie*, No. 10, 1887), the diseases known as sycosis, furuncle, and impetigo, are due to the same cause—the presence of

the Staphylococcus pyogenes aureus and albus. In every case of these diseases the author was able to find these micrococci in great numbers. In some, though few lesions, one only of the two above varieties was found, while in most instances the two were indifferently present. In personal inoculations the results were in accordance with the clinical investigations.

LEPROSY AND VACCINATION.

In the *British Medical Journal* of June 11, 1887, GAIRDNER reports two cases of leprosy, both of which were apparently consequent upon inoculation through vaccination. A physician, practising at a well-known endemic seat of leprosy, vaccinated his son with the crust obtained from a healthy child in a leprous family in whom leprosy subsequently showed itself. Using his own child as a *vaccinifer*, he vaccinated the child of a Scotch sea-captain. Later his own child exhibited symptoms of the disease, in a mild form, while the son of the sea-captain developed the disease in its rapid and worst type.

PRURITUS HIEMALIS.

PAYNE reports (*British Medical Journal*, May 7, 1887) several cases of the more severe type of this affection, and adds his experience on the subject of treatment. Unfortunately the disease is difficult to manage, and usually palliation only is to be anticipated. The underwear should be soft and unirritating; soft, pure woollen should be worn; not the coarse, rough, irritating woollen mixtures which are generally sold. The skin should be protected by an oily or viscid lubricant. This permeates the epidermis and makes it a more perfect non-conductor, and the cutaneous nerves are thus better shielded against temperature variations. The author has had best results with glycerin lotions. Internally chloral was occasionally administered at night.

NAPHTHOL.

Attention is again directed (*Medical Record*, May 21, 1887) to the use of naphthol in cutaneous diseases by ALLEN. The preparations known as betanaphthol and hydronaphthol were employed, and the author considers that the effects are therapeutically the same. Good results were obtained in the dry and scaly forms of eczema, especially in eczema of the scalp. In scabies the author is able to corroborate the favorable reports of Kaposi and Van Harlingen. It acted well also in pruritus, pityriasis capitis, pediculosis capitis, tinea tonsurans, and alopecia. In two cases of alopecia areata its favorable effect was noticeable; in one case the naphthol crystals were rubbed into the patch, in the other the remedy was applied as a ten per cent. ointment. In other affections of the skin than those above named, naphthol showed no special influence. The drug was employed usually in an ointment with vaseline, lard, or lard and lanolin in the strength of five to sixty grains to the ounce. In collodion it acts well in psoriasis, trichophytosis, etc. It may also be applied, when indicated, in powder with starch, Fuller's earth, and similar substances. In regard to the possibility of danger from absorption, the author concludes, from his experience, that if a pure article is used no bad effects will occur.

ICHTHYOL AND RESORCIN: A CLINICAL STUDY OF THEIR EFFECTS.

JACKSON contributes (*Journal of Cutaneous and Genito-Urinary Diseases*, June and July, 1887) his experience in the use of these two remedies. Ichthyol (ammonio-sulphate) was employed and its effects followed up in 3 cases of rosacea, 8 cases of eczema, 6 cases of acne, 1 case of sycosis, and 3 cases of ulcers. In rosacea, in 2 cases the effect was negative; in the third case the disease was aggravated. Of the eczema cases, 4 were made worse, 2 were uninfluenced, 1 greatly benefited, and 1 temporarily improved. (In these last cases, the ichthyol was prescribed in Lassar's paste.) Of the acne patients, 1 was cured (bromide of arsenic was given by the mouth), 2 made worse, 1 temporarily benefited, 1 improved, and in 1 no effect. In the case of sycosis, the disease was aggravated, and the same may be said in regard to the 3 cases of ulcers in which it was used. In the above cases the remedy was prescribed externally, in ointment, with vaselin or lard, in strength varying from three to thirty per cent.—the weaker strength being used in the eczema cases. In some cases, also, the remedy was prescribed by the mouth in addition to its use externally. The author passes the following judgment: Ichthyol is an unreliable preparation when used alone; in some cases it is of apparent benefit when exhibited as an adjuvant, but it is not so good as many other old and well-approved remedies.

In the use of resorcin the writer was able to follow out its effects in 6 cases of eczema, 3 of epithelioma, 3 of scrofuloderma, in 1 of lupus erythematosus, 1 of lupus vulgaris, and 1 of psoriasis. In eczema it was prescribed in ointment and glycerine, two to twelve per cent. strength; 1 case was cured, 2 improved, and 3 aggravated. In epithelioma, in five to fifty per cent. ointment, all (3) the cases were improved, 2 healing completely, although later one of these showed a return at the edge of the patch. In the 3 cases of scrofuloderma, in ten to twenty per cent. strength, improvement was noted, in one a cure taking place; in these cases arsenic and iron were taken by the mouth. In the case of lupus erythematosus, under the use of a twenty per cent. resorcin ointment, the disease rapidly improved; phosphorus was given internally. In the case of lupus vulgaris (non-ulcerating), constant improvement was noted. In the patient with psoriasis, the first effect was favorable, but later the remedy exerted no influence. The writer summarizes his experience with resorcin as follows: Resorcin is an irritating substance for use in eczema, though at times it may prove very efficient in chronic cases where active stimulation is indicated. It exerts a powerful absorptive effect on new cell infiltrations. It is a useful addition to our list of remedies for the treatment of epitheliomatous lesions where surgical procedures are contraindicated from any cause.

HERPES DIGITALIS.

Under this name, BLASCHKO describes (*Deutsche medicinische Wochenschrift*, No. 27, 1887) a case of a peculiar recurrent herpetic eruption occurring on the index-finger of the right hand. The eruption was confined to this part, and consisted of grouped vesicles upon a slightly inflamed base. A few days before an outbreak there is more or less neuralgic pain in the affected finger

and back of the hand. The vesicles are deep-seated, and form elevations the size of a split pea. There is at first slight burning, and, later, increasing itchiness is a noticeable symptom. There is no tendency to rupture, the thick unyielding wall of the lesions preventing this termination; nor is there, as a rule, any tendency to spontaneous involution. If the lesions are not soon punctured and emptied, a lymphangitis, extending up the arm, with painful enlargement of the axillary glands, results. The contents of the lesions are usually clear, becoming cloudy if of long duration. This process has recurred for the past two years, at first three or four months intervening, but later at intervals of six or eight weeks. The number of lesions present in the different attacks has varied from two to fifteen. The duration of an attack depends, to a great extent, upon the number of vesicles, averaging about two weeks. There was no scarring. The writer regards the disease as probably belonging to the trophoneuroses.

A Case of Chronic Dysidrosis of the Face.

ROSENTHAL reports (*Deutsche medicinische Wochenschrift*, No. 20, 1887) a case of dysidrosis, or sudamen, of the face occurring in a woman, aged fifty-four. The disease has lasted nine years, becoming worse in the summer season. The lesions appear as small, solid bodies in the skin, in appearance not unlike milia. On examination, however, they were found of a vesicular nature; the contents clear and of an acid reaction. A few vesicles contained minute blood coagula, due, the writer considers, to external traumatic agency. There was neither scaling nor crusting. Lesions appeared to last almost indefinitely; disappearing always by absorption. The application of a one to two per cent. alcoholic solution of naphthol was found useful.

Eruption from Internal Use of Arsenic.

DR. LEONTOWITSCH (*Monatshefte für Prak. Derm.*, No. 12, 1887) reports a case of eruption from the internal use of Fowler's solution occurring in an old lady, the dose being a small one, twice daily, administered for the relief of obstinate chills and fever. On the second day, severe itching manifested itself on the neck and chest; on the third day, a small macular red exanthem appeared upon the above-mentioned regions, the skin being slightly swollen and the seat of intolerable itching. By the fifth day it had spread over the abdomen. Upon discontinuing the remedy the cutaneous symptoms disappeared in three or four days, but were reproduced as before on taking the arsenic a second time. It was subsequently shown that while the patient could not tolerate either arsenite of potassium or arsenious acid with bromide of potassium, arsenite of quinine caused no unpleasant symptoms. An idiosyncrasy was supposed to exist.

On the Contagiousness of Tinea Versicolor.

HUBLÉ (*Annales de Derm. et de Syph.*, No. 6, 1887) has recently made some researches upon tinea versicolor, its transmissibility, and its consequences in

judiciary medicine. Kaposi has denied its contagion, and Hardy has stated that it is but slightly contagious. Hublé protests against these views and cites nine cases of contagion, from man to woman, or *vice versâ*. He mentions, moreover, two cases of mediate contagion through the means of flannel undershirts. The author gives his experience with inoculation. In the first series of experiments scales scraped from a patch of disease were simply applied to the skin, with negative results at the end of thirty days. In a second series of experiments the skin was rubbed until red, and the scales were applied to the surface by means of glycerine and plaster, positive results appearing at the end of two weeks. In a third series in one spot the scales were removed with a lancet, and in another region the exfoliating epidermic scales were simply wiped off, and the tinea scrapings were applied by means of glycerine and gold-beater's skin; in both places evidences of the disease were soon (in a few weeks) visible.

A Case of Pemphigus Cured by Applications of Oleate of Mercury.

Crippe (*British Medical Journal*, January 29, 1887) gives the notes of a case of an extensive pemphigoid eruption (Dermatitis herpetiformis?—Eds.) of several months' duration, in which inunction of the oleate of mercury seemed to bring about a cure. Blebs were present in large numbers, although at times the eruption was of a multiform type. When first seen small doses of arsenic were prescribed, and a five per cent. oleate ointment applied to one arm. The eruption on general surface remained unchanged, but rapid improvement was noted to occur on the part to which the oleate had been applied. Later the same ointment was gradually prescribed for the whole surface and with the same favorable result. A cure was effected in seven weeks.

The Pathology of Lichen Ruber.

Since 1880, Köbner (*Berliner klinische Wochenschrift*, Nos. 20 and 21, 1887) has treated fifty-two cases of this disease. Of this number only two were of the serious type described by Hebra. The author recognizes, as do most writers, two varieties of the disease—lichen ruber acuminatus, and lichen ruber planus—and in his experience the latter type is by far the more frequent. The writer finds, from numerous examinations, that this disease has primarily its beginning in dilatation of the bloodvessels and perivascular cell-infiltration in the upper part of the corium in the papillæ, and along with this is noticed rapid growth of the rete; but involvement of the hair follicles or sweat-glands, which is referred to by most writers, was found to be inconstant and incidental. Careful examination for bacilli gave negative results. The author's cases tended to prove the neurotic origin of the disease. Arsenic was the remedy which gave good results. Unna's ointment was found valueless.

MIDWIFERY AND GYNECOLOGY.

UNDER THE CHARGE OF

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MASSAGE IN GYNECOLOGY.

PROFENTER (Braumüller, Wien, 1887) here considers the effect of massage in subacute and chronic inflammatory processes in the female pelvis. In a short preface Prof. Schultze, of Jena, states that he has tested the results of the method and found them good, and he believes "that the method of Brandt gives valuable results in stretching and slackening old parametric exudations, as well as restoring fixation in prolapsus uteri." He point out, also, that the treatment requires very accurate diagnosis as well as great expenditure of time. In the introduction Profenter gives the history of the application of the method. It is due to a Swede, Brandt, who was not a medical man, and who, apart from professional instruction, gained much insight into pelvic disorders. In 1847 he treated prolapsus recti in a soldier by rubbing up, as it were, the sigmoid flexure. He next turned his attention to prolapsus uteri, and cured, it is said, three cases in a few weeks. The method was then extended to retroflexed and fixed uteri, chronically inflamed ovaries, and chronic cellulitic and peritonitic adhesions, all with good results. Profenter studied Brandt's results for a week, found them good, and had his scepticism removed. Cases are then recorded. Of these a selection is appended. It must, of course, be noted that the massage is local and bimanual, and is not to be confounded with the general massage of the body practised in Weir Mitchell's treatment.

Case 1. *Chronic parametritis posterior, chronic ovaritis, and slight cystitis.* Oct. 23, patient has pain on urination. Bladder washed out from October 24th to November 10th: rest in bed; alterative tampons also tried.

November 18th, *status præsens* as follows: Movement of the uterus to the front restricted; left uterosacral ligament shortened, thickened, and painful on pressure; left ovary slightly painful on pressure. The treatment consisted in systematic stretching of the shortened ligament, and massage of the left ovary. On December 4th, the uterus had its fundus to the left of the median line, and movement, even to the neighborhood of the symphysis, was painless.

Case 12. *Chronic parametritis and perimetritis.* Condition under narcosis: Marked induration of the broad ligaments. The patient complained of pain of the left side and head; pain on micturition and defecation, with hysterical attacks eight days before menstruation. By massage the exudation disappeared, and the uterus and ovaries became normal.

Case 16 was one of complete prolapsus uteri. The uterus was replaced and anteflexed according to Brandt's method, and apparently cured in a month.

[Massage has often been recommended in text-books, especially for old inflammatory exudations. Freund has also recommended it in such cases, and

it is undoubtedly worthy of trial. Schultze's recommendation is of high value as he is known as one of the most careful observers of chronic inflammatory exudations, and his work on their relation to uterine displacements is of the greatest value. One is inclined to doubt the value of massage in prolapsus uteri most].

Insanity and Oöphorectomy.

Leszynsky (*N. Y. Med. Journ.*, June 25, 1887) gives an account of two cases in which oöphorectomy was performed for insanity. While he admits that we may have reflex irritation from a diseased uterus or ovary, he points out the preponderance of psychical causes and criticises the practice of oöphorectomy in the insane, alleging that "the premature and indiscriminate removal of the ovaries in cases of insanity and other neuroses, has of late become so frequent and flagrant a procedure as to demand an emphatic protest against such reprehensible measures, and such illegitimate practice."

Leszynsky would only advise oöphorectomy when a distinct pathological condition was present, and had a preponderating influence. The effect of septicæmia in mania is well known. Clouston, in his *Mental Diseases* (London, 1883) says, "I believe that some day we shall hit on a mode of producing a local inflammation or manageable septic blood poisoning, by which we shall cut short and cure attacks of acute mania." (Op. cit., p. 190.)

On Extraperitoneal Extirpation of the Uterus.

Frank (*Arch. f. Gynäk.*, Bd. xxx. Heft 1) describes a series of extraordinary cases where he performed what he terms extraperitoneal extirpation of the uterus. In this paper he does not detail his method specially, but he evidently in certain cases, by a process of enucleation, removes the greater part of the uterine substance without opening the peritoneal cavity—*i. e.*, he leaves the peritoneum intact. The summary of his chief cases fully justifies the term "tumor operations," applied by Stratz (*Centr. für Gynäk.*, April 23, 1887). In regard to risk of bleeding, Frank alleges that the traction on the uterus hinders it. The suturing of the peritoneal folds also checks it, and, if necessary, ligatures can be passed up as far as the Fallopian tube angle, so as to control the ovarian artery, or iron solutions can be applied.

Frank alleges that the enthusiasm for total extirpation of the uterus is greatly diminished. When the disease has advanced so far as to affect the body, the parametrium is sure to be infiltrated too. He advocates his operations not so much in carcinoma as in old adherent displacements, pruritis uterinus, and adenomatous degeneration.

One could understand this operation in certain cases of carcinoma uteri. Marion Sims, in one of his last papers, records a case of carcinoma uteri where he curetted thoroughly, so that he could have inverted the thin peritoneal sac of the uterus and ligatured it. He did not do so, and adds that he nearly performed a brilliant operation (quoted from memory).

On a Case of Spontaneous Inversion of the Uterus.

Dr. N. T. Brenis (*Edin. Med. Jour.*, July, 1887) records a case of spontaneous inversion of the uterus, following the expulsion of a fibroid polypus.

The remarkable feature in the case is that, after attempts at manual reinversion had failed, reinversion was brought about by the repeated use of the hot douche. He considers that the hot water acted by lessening the bulk of the organ, and bringing about contraction of the longitudinal fibres, with widening of the constricting ring.

THE APPLICATION OF COCAINE IN PLASTIC GYNECOLOGICAL OPERATIONS.

KÜSTNER (*Verh. der deutschen gesellschaft für Gynäk.*, Erst. Koupres, 1886) considers here the effects of cocaine as a local anæsthetic in some of the plastic operations in gynecology. Fränkel limits the use of cocaine to short operations, only to those needing merely an incision or scissor's cut; while Schramm would employ it in all plastic operations. Küstner takes an intermediate position, and thinks the value of cocaine can best be estimated by trying it in painful plastic operations, viz., those at the posterior commissure. He tried it, therefore, in 42 operations, as follows: 5 posterior colporrhaphies, 31 partial plastic operations in the perineum, 4 total plastic operations in the perineum, 1 hymen excision, 1 cyst excision on the left side of the vagina.

The parts to be operated on were first disinfected, and then repeatedly brushed with a 20 per cent. solution until the mucous membrane was somewhat pale. Poisoning never occurred. The results were as follows: In 8 cases, bad; the patients complained of great pain; in 23 cases it worked well, and in 10 there was complete anæsthesia. Küstner recommends cocaine strongly in plastic operations.

[Cocaine cannot replace general anæsthesia, as we must remember that the patient is still conscious in cocaine operations. What most women in this country object to is not only the pain but the exposure, and results such as Küstner's would cause mutiny in an English hospital.]

THE CONSTITUTIONAL TREATMENT OF PUERPERAL SEPSIS.

RUNGE (*Arch. für Gynäk.*, Bd. xxx. Heft. 1) here gives the results of the form of treatment he recommends in puerperal septicæmia. This consists in the administration of large doses of alcohol, the use of tepid baths, and abundant nourishment, with abundance of antipyretics. He holds further, that as the disease goes on the body becomes more capable of resisting, and points out that while local treatment can limit further entrance of the poison we can do nothing against what is already absorbed. One must, therefore, strengthen the resisting powers of the organism. The alcohol lessens the destruction of albumen in the body, and hinders cardiac failure, while the baths help digestion, and increase appetite. They are not used to keep down temperature. The temperature of the water should be 72°–75° F., and the bath should last for five to ten minutes. Collapse can be prevented by alcohol.

Three cases are narrated with one death.

[Runge uses local treatment, too, and therefore the treatment he recommends is what most men would employ in this country, with the exception of the tepid baths, which seem dangerous and troublesome, unless for reduction of high temperature. There are better means of improving the appetite and heart than this.]

On Placenta Prævia.

BAYER (*Verhandlungen der deutschen Gesellschaft für Gynäkologie*) advances a new theory of placenta prævia cases, in order to harmonize them with opening up of the cervical canal during the later months of pregnancy. The following is a *résumé* of his views:

He first states Matthew Duncan's view in regard to the hemorrhage in placenta prævia. According to Duncan, the lower portion of the uterus forms in advanced pregnancy a part of half a sphere, of which the internal os is a pole. During labor this segment of a sphere becomes converted into a cylinder with consequent dilatation of the placental site and separation of the placenta. As the normally placed placenta is separated (according to Bayer and others) by uterine retraction which arrests bleeding during the separation, the bleeding in placenta prævia is caused by the expansion of the lower uterine segment. Of course, during this expansion the internal os also opens up. As Duncan holds that the internal os only opens up during labor, he logically holds any bleeding during pregnancy as accidental.

Since Duncan's paper was written, the development of the lower uterine segment has become known as the development of a special zone between the contracture ring and Müller's ring. The development of the lower uterine segment (from the cervical canal) explains, according to this writer, the bleedings in placenta prævia during pregnancy.

Bayer then considers the opinions of those who hold that the lower uterine segment is derived from the uterus by stretching and thinning. If the placenta is inserted over the os internum, it must, as growth of the segment goes on, either be separated or grow with it. As the lower uterine segment does not take part in uterine retraction, but is, as it were, in a condition of paralysis; and as, if uterine, its circulation must be abundant, fatal hemorrhage should take place during placental separation.

Bayer then states his opinion that the presence of the placenta in the lower uterine segment is an impossibility, at least for those that end favorably. In the uteri he has examined, he has never found the placental site below an evident contracture ring or in a properly formed lower uterine segment.

Bayer alleges that the idea of the cervical canal opening up in some cases and its remaining intact in others, explains the clinical features of placenta prævia as well as the anatomical relations he has observed.

From observations of about 20 cases, he asserts that defective development of the supravaginal portion in the cervix is a typical occurrence in placenta prævia, that in the worst cases the internal os remains intact until labor begins, and that a lower uterine segment does not, therefore, develop. When the placenta dips near the os internum, Bayer believes that if the cervix open up to form the lower uterine segment, the placenta will thus be carried out, as it were, from the dangerous area when the placenta covers the os internum. Bayer holds that the cervical canal may not open up, that these form the cases where we have no bleeding until the full time; in others, he holds it does open up and we, therefore, have bleedings during pregnancy which leave traces in the placenta and membranes there. In his cases these changes were found in the placenta, in only the latter class.

A Contribution to the Anatomy of the Post-partum Uterus, with
Special Reference to Placenta Prævia.

Hart (*Edin. Med. Journ.*, July, 1887) describes the relations of the anterior
uterine wall in a woman with placenta prævia, who died immediately after
delivery. The placenta was attached to the anterior uterine wall, and it was,
therefore, examined by the microscopic sections, so as to ascertain the various
relations of peritoneum, cervix, etc. He found the cervical canal 1½ inches
long, with a distinct os externum, and a distinct upper limit to it. Be-
tween the thick retracted wound and this upper limit of the cervical canal,
was a thinner portion, with peritoneum separated, and with placental remains
in its upper half. This he believes to be the lower uterine segment.

He therefore asserts that this preparation shows these portions of the
uterine wall: 1. A thickened retracted portion, with peritoneum adherent.
2. A thinner portion, with peritoneum separated—lower uterine segment. 3.
Cervical canal. He believes that the placenta should be defined as prævia,
when attached in part to the lower uterine segment, and that it is separated
during labor by the expansion the lower uterine segment then undergoes. He
holds that the peritoneum over the lower uterine segment is separated in the
same way, and that the diminution in area occurring about the contraction
ring can only separate the placenta. He therefore alleges that he has demon-
strated what Bayer terms a "physiological impossibility," viz., placenta in
lower uterine segment.

Internal Puerperal Erysipelas.

Winckel (*Verh. der Deutschen Gesellschaft für Gynäk.*, 1886) first alludes to
a previous communication given by him at Munich on puerperal erysipelas,
where he pointed out that the spread of erysipelas took place through the
lymphatics of the vagina, uterus, and pelvis, with those of the abdomen and
chest; that in all lymphatic forms of puerperal fever we must seek for chain
micrococci in the exudations, in the pleura, peritoneum, and in the joints.
He pointed out further, the frequency of pneumonia in puerperal erysipelas,
and urged that we have in it a poison different from that of puerperal fever.
Gusserow also holds the same opinion in relation to puerperal fever and ery-
sipelas.

Winckel now gives a more complete research on this interesting subject.
In January, 1886, a patient was admitted to hospital with a parametric exu-
dation, suppurating, and passing through the ischiatic notch. Aspiration of
this with a purified Pravaz's syringe gave pus which contained the erysipe-
latous micrococci of Fehleisen. A pure cultivation of them was obtained,
and erysipelas conveyed to a rabbit by it. On February 27, 1886, a primipara
was delivered normally. The pulse, however, was high on Winckel's first
visit (120), and remained above 100 for the next two days, there being no ele-
vation of temperature; on the evening of the third day the temperature was
100° F.; next morning, 102.5 °F., and pulse 144. Pressure on the uterus caused
a flow of badly smelling lochial secretion. On the posterior commissure,
fourchette, and the inner surface of the left labium minus, was a puerperal

ulcer. During the night there were great pains in the abdomen, and there developed peritonitis, with erysipelas on the nates. Her after-condition was briefly as follows: February 7th, midday—pulse 128, dicrotic; temperature 102° F.; respiration 42, and superficial. Pains felt over sacrum and epigastrium. There was impairment of percussion noted over the bases of both lungs, but no cardiac murmurs. Tympanites was very great, and fundus uteri two finger-breadths above symphysis. The spleen was enlarged, the sacral regions erysipelatous; no œdema or other change in the legs. Left labium minus swollen, ulcerated; discharge slight and mucopurulent. Bladder contained nearly a pint of clear urine, and the lips of the cervix uteri were covered with croupous exudation passing into the cervical canal. It was impossible to make out any parametric exudation separate from the peritonitic one.

Diagnosis.—Erysipelas of nates; vulvar ulcers; metrolymphangitis; diffuse fibrinous peritonitis.

Prognosis.—Bad.

The patient went on from bad to worse, the lung-mischief increased, with sickness and abdominal pain. Death took place on the forenoon of February 9th. Before the body had cooled, blood was aspirated from the right side of the heart for examination as to microörganisms.

On *post-mortem* examination the following conditions were found: Diphtheroid superficial defect at vaginal entrance; diphtheroid endometritis; superficial necrotic metrolymphangitis; purulent salpingitis of the outer tissue of the right tube; right-sided ovaritis; diffuse purulent peritonitis, with considerable mucopurulent and hemorrhagic exudation; undoubted cloudy swelling of the sub- and retroperitoneal connective tissue; double pleurisy (beginning) with spread to diaphragm and purulent affections to subpleural lymphatics in part.

Marked swelling of the intestinal tract was also present, with marked anæmia of the abdominal organs.

The uterus was barely the size of a man's fist, with purulent points in its walls. The uterine cavity was the size of a hen's-egg, and contained about a teaspoonful of dirty reddish-brown fluid. The placental site had been on the anterior wall, and on section there, spongy and purulent foci were seen. The pleural sac contained a little cloudy, grayish-red fluid; anterior mediastinum had œdematous swelling, and there was some fluid in the pericardium.

The blood taken shortly after death from the right side of the heart was found to contain Fehleisen's micrococci; these were cultivated, and when inoculated into a rabbit's ear gave it erysipelas. Erysipelatous micrococci were also found in the peritoneal and pleuritic exudations. They were also cultivated from spleen, lungs, uterus, kidneys, liver, and heart-muscle. Microscopic examination of the organs gave diplococci, as well as chain cocci. The kidneys contained many micrococci colonies.

Inoculation experiments on animals gave further proofs, but rabbits, guinea-pigs, and rats showed less reaction than white mice, which, after inoculation, showed severe general symptoms, dying in periods varying from six hours to seven days. Alcohol was found to inhibit the growth of the micrococci, but liquor ferri sesquichlorati was found fatal to them.

The following is a summary of the chief points in this most valuable paper:

a. Clinical points.

1. The most frequent originating points in five-sevenths of all puerperal erysipelas cases are the genitals and nates—Hugenberger, 13 out of 15; Gusserow, 7 in 14; Winckel, 30 in 42.

2. Primiparæ are affected three to four times more frequently than multiparæ.

3. Puerperæ with vulvar wounds are specially predisposed.

4. Severe operative cases are affected more frequently than others.

5. The children of erysipelatous puerperæ remain erysipelas-free.

6. The greater the number of severe puerperal fever cases, the greater the number of erysipelatous ones.

b. Bacteriological points.

7. In pus from a parametritis (Case 1) and in all the organs and tissues of a fatal case of puerperal erysipelas, were the characteristic erysipelas cocci found.

8. The cultivations gave positive results agreeing with those of Fehleisen.

c. Points made out by experiments on animals.

9. Erysipelas was caused in different animals by cultivations of erysipelas cocci, obtained from the tissues of the puerperæ who died.

10. By injections of these cultures inflammatory affections were obtained.

11. In the blood and organs of the animals so infected the cocci were found.

12. As in the case of other microörganisms, different animals reacted differently to the cocci. The most easily poisoned are white mice.

Winckel uses the term internal puerperal erysipelas. For puerperal sepsis, he suggests, "spaltpilzvergiftung," and for internal puerperal erysipelas, "erysipelatöse spaltpilzvergiftung.

[This paper is an important one, inasmuch as it is an investigation in which Koch's cultures for microörganisms causing a disease, are fully demonstrated. It also seems to follow that infection takes place by touch—hence the importance of purified hands.]

Cattle-Horn Lacerations of the Abdomen and Uterus In Pregnant Women.

HARRIS (*American Journal of Obstetrics*, July, 1887) gives here the known cases of cattle-horn lacerations of the pregnant uterus in women. The remarkable fact comes out that the results as to the mother's life, of what may be termed "bovine Cæsarean section," are better than those obtained by surgeons, unless in quite recent times. The bad results obtained by tumor operators in Great Britain and America he quite rightly attributes to delay in operations and to useless and hurtful trials to deliver by craniotomy. Thus the record of Cæsarean operations performed by medical men in the United States for the last seven years is not so good as in bovine Cæsarean section, the former having a mortality of nine in eleven cases, the latter of four in nine.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

UNDER THE CHARGE OF

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RUPTURE OF THE UMBILICAL CORD AT BIRTH.

P. BUDIN (*Annal. d'hyg. publ.*, ser. 3, t. xvii. pp. 534–540, 1887) has communicated to the Société de Médecine légale de France, a paper on this subject, in which, after briefly reviewing a few cases of this kind, he details two cases of his own, which happened recently within the Charité. The one was that of a woman, aged twenty-nine, who had previously borne a child, and who after admission to the Charité, and while lying in bed, expelled a mature and living fœtus, with such force that the cord was ruptured at a point about four inches from the umbilicus. The child, which weighed 6½ pounds, survived. The cord was seventeen inches long. The other case was that of a primipara, aged twenty-seven, who about the end of the eighth month of pregnancy, was delivered of a child, which, as in the previous case, was expelled with such force that the umbilical cord was torn across near to the umbilicus, although the woman was lying horizontally in bed. The child weighed 5½ pounds, and the length of the cord was fifteen inches. The child survived. These cases are interesting to the medical jurist as being extremely rare.

DETECTION OF SPERMATOZOA IN SPERMATIC STAINS.

UNGAR (*Viertelj. f. gerichtl. Med.*, N. F., Bd. xlvii. S. 316–327) now gives the results of a somewhat elaborate investigation of the agents most suited for staining spermatozoa, and thus revealing their presence. He describes several methods of staining, by which he has obtained good results. He begins by placing a small piece of the cloth stained with spermatic fluid in a watch-glass containing distilled water, to which a minute quantity of hydrochloric acid has been added (1 drop to 1⅓ ozs.). The acid prevents the spermatozoa swelling up and breaking. Maceration is allowed to continue for one to ten hours, depending on the freshness of the stain. The cloth is now removed and stripped, and the strippings, as also the macerated fluid, placed in a thin layer on a number of cover-glasses. The fluid is then dried on the cover-glasses by passing them three times quickly through a flame. The dried residue is now stained by placing the cover-glass in a watch-glass containing staining fluid. The author has found a process of double-staining the best. For this purpose he employs a combination of eosine and hæmatoxyline, using first the one and afterward the other. The eosine solution consists of 38 grains of eosine dissolved in 1 ounce of rectified spirit and 2⅓ ounces of distilled water. The cover-glass is allowed to swim in this fluid for one hour. It is then removed and allowed to dry. It is now washed with a

mixture of one part of alcohol and two parts of water, and is dipped in the hæmatoxyline solution. This solution is made according to the Friedländer formula or to Böhmer's formula. Friedländer's is hæmatoxyline 2 parts, absolute alcohol 100 parts, distilled water 100 parts, glycerine 100 parts, alum 2 parts. The solution should be preserved in a dark place. If the cover-glass with dried spermatozoa is allowed to remain sufficiently long (a few minutes to a few hours) in either of these fluids, a characteristic and beautiful double staining is finally obtained. While the hinder part of the head of the spermatozoa is stained dark-blue, the forepart of the head, the middle piece, and the tail are stained deep red, as are all other parts of the preparation, except cell nuclei, which are blue. The addition of 1 drop of acetic acid to 1 ounce of the hæmatoxyline solution, will largely prevent overstaining with that reagent.

Besides this combination of staining reagents, the author has tried others, of which he gives details, but none is so perfect as that described, for example, a combination of carmine-alum and eosine, or of vesuvine and eosine.

DETECTION OF PHOSPHORUS IN A BODY THREE MONTHS AFTER DEATH.

POLECK (*Vierteljahrsschrift für gerichtliche Medicin*, N. F., Bd. xlvi. S. 286–297, and Bd. xlvii. S. 41–55, 1887) gives the details of a case of phosphorus poisoning, in which the feature of chief interest was the detection of the poison in the exhumed corpse three months after death. The case was that of a man who had been poisoned by his wife. They had been on the worst of terms for some time previously. After a midday meal of flesh, meal sauce, etc., prepared by his wife, and not shared as usual by her, the husband was, toward evening, suddenly seized with a violent convulsion, and became almost completely unconscious. After an hour he recovered. Next day he was very ill, suffering from occasional convulsions, violent diarrhœa, and involuntary passage of urine and feces. In spite of this no doctor was called in. The man died on the fourth day. His wife was at once suspected by the neighbors of having poisoned him, but as the doctor who was asked to examine the body, certified, from an external examination, that the man had died of cerebral apoplexy, no further step was taken at the time by the criminal authorities, and the body was buried. But as suspicion still existed, and became gradually stronger, the body was exhumed three months after death, and a complete examination was made—the pathological by Professor Friedberg, and the chemical by Dr. Poleck. No free phosphorus was found in the body, but phosphorous acid was met with in the alimentary canal, and in the tissues generally. As phosphorous acid is not a normal constituent of the body, Poleck concludes that the most reasonable, and almost the sole explanation of its existence, is that it was due to the partial oxidation of phosphorus. A trace of arsenic and antimony was also found. This was of interest, as some mice poison found in the possession of the accused woman, which consisted largely of free phosphorus, contained a trace of arsenic and antimony.

TOXICITY OF ACETYLENE.

J. OGIER (*Annal. d'Hyg. Publ.*, sér. 3, t. xvii. pp. 454–456, 1887), read a report on the toxicity of acetylene, at a recent meeting of the Société de

Médecine légale de France. The report is of interest, as acetylene is a gas which is largely produced in the imperfect combustion of carbonaceous material, and is an important constituent of coal gas. The report especially deals with the experiments of M. Brociner, who tested the action of acetylene on blood, and caused certain animals to inhale various mixtures of acetylene gas with air or oxygen. The conclusions arrived at are the following: 1. Blood charged with acytelene exhibits no characteristic appearance spectroscopically. 2. If any combination is formed of acetylene and hæmoglobin, it is very unstable. 3. Acetylene is not sensibly toxic by itself, and in this respect resembles other members of the same chemical group, as propylene.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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MILK INFECTION.

In the January number of the present year, account was given of Dr. Klein's investigation into the relations between human scarlatina and a disease of the cow, which had been shown by Mr. W. H. Power to be its cause. Dr. Klein has since continued his study of these relations, and has presented to the Royal Society a paper on the subject, from which the following is extracted. (*Proceedings of the Royal Society*, vol. xlii.)

Dr. Klein had previously shown that certain suspected cows, on a farm at Hendon, had besides a skin disease—consisting of ulcers on the udder and teats, and in sores and scurvy patches and loss of hair in different parts of the skin—also a general disease of the viscera, notably the lungs, liver, spleen, and kidney, which resembled the disease of these organs in acute cases of human scarlatina. He had further shown that the diseased tissues of the ulcers on the teats and udder, produced on inoculation into the skin of calves a similar local disease, which in its incubation and general anatomical characters, proved identical with the ulceration of the cow, and further, that from the ulcers of the cow a species of micrococcus was isolated by cultivation in artificial nutritive media, which microörganism in its mode of growth on nutritive gelatine, on agar-agar mixture, on blood serum, in broth, and in milk, proves very peculiar and different from other species of micrococci hitherto examined. With such cultivation of the micrococcus he had produced by subcutaneous inoculation in calves a disease, which in its cutaneous and visceral lesions (lung, liver, spleen, and kidney) bears a very close resemblance both to the disease which was observed in the Hendon cows, as well as to human scarlatina.

More recently in examining acute cases of scarlatina, Dr. Klein found that

there is present in the blood of the general circulation a species of micro-coccus, which on cultivation in nutritive gelatine, agar-agar mixture, blood serum, and other media, proved to be in every respect identical with that obtained from the Hendon cows. Out of eleven acute cases of scarlatina examined in this direction, four yielded positive results, three were acute cases between the third and sixth day of illness, with high fever and tempe-rature, and the fourth was a case of death from scarlatina on the sixth day. In all these four cases several drops of blood were used after the customary methods and under the required precautions for establishing cultivations in a series of tubes containing sterilized nutritive gelatine, and generally only a very small number of these tubes revealed after an incubation of several days, one or two colonies of the micrococcus.

Having ascertained the identity in morphological and cultural respects of the micrococcus of the blood of human scarlatina with the organism obtained from the Hendon cows, the action of the cultivations of both these sets of micrococci was then tested on animals, and the results compared. It was found that mice—wild mice better than tame ones—on inoculation, as well as feeding, became affected in exactly the same manner, no matter whether the one set of cultivations or the other was used. The great majority of these animals died after between seven or twenty days. The post-mortem exami-nation revealed great congestion of the lungs, amounting in some cases to consolidation of portions of the organ, congestion of the liver, congestion and swelling of the spleen, great congestion and general disease of the cortical part of the kidney. From the blood of these animals, taken directly from the heart, cultivations were established in nutritive gelatine, and hereby the existence of the same species of micrococci was revealed; they possessed all those special characters distinguishing cultivations of the micrococcus, of the Hendon cows, and of the human scarlatina.

In the third and concluding section of the work, cultivations of the micro-coccus of two cases of human scarlatina were used for infecting calves; two calves were inoculated and two were fed from each set of cultivations; all eight animals developed disease, both cutaneous and visceral, identical to that produced in the calves that had been last year infected with the micrococcus from the Hendon cows. From the heart's blood of calves thus infected from human scarlatina the same micrococcus was recovered by cultivation, possess-ing all the characters shown by the cultures of the micrococcus of the Hen-don cows and of the cases of human scarlatina.

Mr. William Brown, F.R.C.S., Medical Officer of Health for Carlisle, relates in *The Sanitary Record* for July, 1887, an account of an outbreak of typhoid fever in Carlisle, in which milk was the vehicle of infection, and where typhoid fever in the inmates of the dairy was associated with an infec-tious fever in the cow. The point of interest in the paper is that the cases occurred at a time when the dairy was believed to be free from infection, but when the cows were suffering from a febrile malady. Mr. Dawson, a veterin-ary surgeon, who had examined the animals, stated that "the diseases from which the cows suffered were all more or less of a febrile character, associated with indigestion and occasionally with slight cough; the pulse of the affected

animals was increased in volume, and varied from 60 to 80 beats per minute, the normal pulse of the ox being from 40 to 45 per minute. The nose was hot and dry, and the horns were alternately hot and cold. There was very marked lumbar tenderness, which was very characteristic in all the sick animals. There was slight abdominal breathing from febrile condition. Constipation was generally present, but not serious. There were only two cases of purging; but in one case the purging was very great; the motions of a frothy character. Some of the animals were very ill, so much so that the dairyman on one occasion feared that one of them would die." Mr. Dawson had some cattle presenting similar symptoms, but such a number of consecutive cases of this nature in the same shed, and extending over such a lengthened period, viz., four years, was to him a new experience.

Dr. W. J. Simpson, Medical Officer of Health for Calcutta, published in the *Indian Medical Gazette* for May, 1887, an investigation into an outbreak of cholera which occurred on board a sailing vessel, the "Ardenclutha," while lying in the port of Calcutta. It was discovered that ten men obtained milk daily from a native; of these, nine were attacked with illness, four had cholera and died, and five had severe diarrhœa. Only one man who drank the milk escaped, and he had only a very small quantity; while eight men who used preserved milk, and three who drank none at all were not affected. The cow from which the milk was taken was in good health, but the native admitted that his milk contained twenty-five per cent. of water drawn from a tank near his house; and it was also ascertained that some of his neighbors suffered from cholera. The dejecta from an imported case drained into the tank, and the patient's clothes were washed in it. As soon as the milk was stopped no cases occurred on board the vessel, though one person living near the tank was attacked two days later.

Animal Lymph in Berlin.

In Berlin, in the Imperial Vaccination Institute, during the latter half of 1885 all vaccinations were performed with animal lymph, two months being devoted to experiments with humanized and animal lymph, and to obtaining all information concerning the process of vaccination. During the months August to December, 1885, there were 959 primary vaccinations, with 98 per cent. personal, and 68 per cent. insertion success; and 738 revaccinations, in which the personal success was 82 per cent. and the insertion success 50 per cent. In addition, 450 tubes were sent to medical men, with the result that of 511 primary vaccinations, the success was 99 per cent. personal and 78 per cent. insertion success; and of 337 school children who were revaccinated, the personal success was 97 per cent., and 70 per cent. insertion success.

The method of vaccinating was to use perfectly fresh lymph, and to insert it by longitudinal incisions for primary vaccinations, and to use older lymph in scratches for revaccination.

The lymph was obtained from animals in the Imperial Veterinary School; there is a large place for special animals, which is of an even temperature in winter and summer.

The cost in Berlin of cultivating animal lymph is great; it amounts to about

fifty marks (about ten dollars) per animal, but then it must be taken into consideration that the veterinary school is outside of the town, and the animals must be brought into the town to be vaccinated, and taken out again.

Retro-vaccination was practised on the animal, the incisions were deep all over the abdomen, and lymph was taken five times after twenty-four hours. Only the upper layer of lymph was free from blood, but the blood could always be removed without injury to the lymph by the use of distilled water which had been previously boiled. The glycerine emulsion was the preparation most used, because it was found that decomposition did not set in whenever glycerine was mixed with the lymph, and experiments were made in which lymph was kept for over a year, and success attained with it when employed for vaccination.

Although the immediate results of animal vaccination were relatively favorable, yet in the end it led to a diminished insertion success, because, on the seventh day, when lymph is to be taken from children vaccinated with calf lymph, the vesicles are often undeveloped and small,[1] and little can be obtained, and the use of this is attended by less satisfactory results. Dr. Schulz comments on the difficulty of taking lymph entirely free from blood from restless children, and observes that the method adopted in Berlin was to mix the vaccine obtained from each child with glycerine, put it into tubes, which were then stood upright until the blood had sunk to the lower end of the tube, which could then be broken off and sealed.

Experiments were also, during 1885 and 1886, carried on at the Berlin Vaccination Station, in order to obtain, if possible, pure lymph free from all foreign bacteria. Animal lymph contains many germs which are not necessary for the production of vesicles, whereas humanized lymph is at times almost entirely free from them when cultivated on meat peptone gelatine. Different kinds of humanized lymph, therefore, were sown in small quantities of gelatine, and wherever colonies developed they were removed from the gelatine, until after eight days only those portions of gelatine remained which contained no germs; this was then used for vaccination, but in a very small number of cases was there any result, even when the experiment was tried with agar-agar mixture, and it was probably due to the dilution of the lymph in the cultivating media.

Dr. Schulz, therefore, says that until further experiments have been made, there is no means for preventing germs from entering animal lymph, and that all that can be relied upon is cleanliness in vaccination, and in taking lymph either from animals or children.—*Deutsche Vierteljahrsschrift f. öff. Gesundheitspflege*, Bd. xix. Heft 2, 1887.

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[1] This statement is not in accord with the reports of the Medical Officer of the Local Government Board, England, on "The Animal Vaccine Establishment." (Twelfth Annual Report of the Local Government Board, Supplement containing the Report of the Medical Officer.)

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